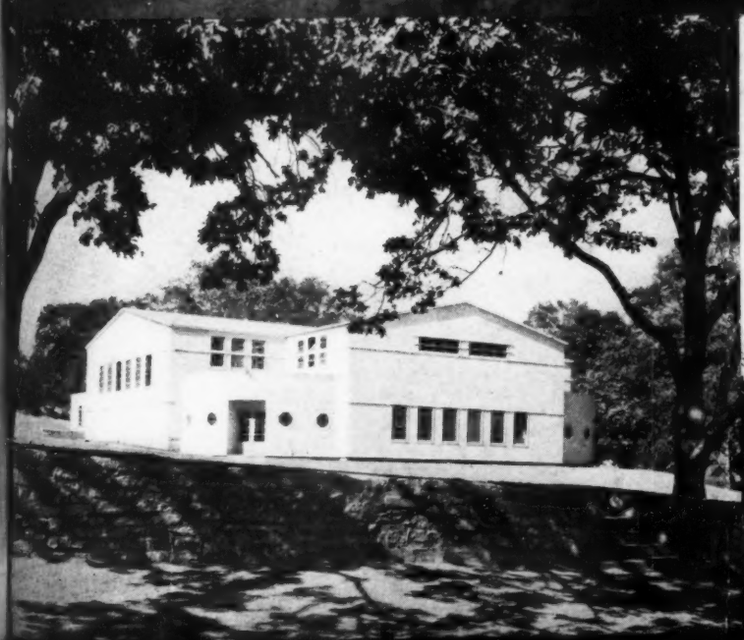

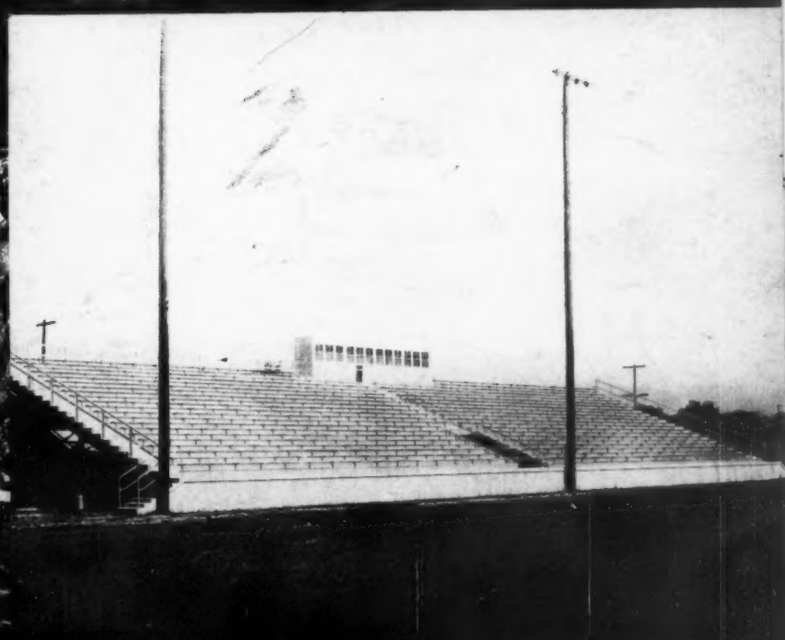

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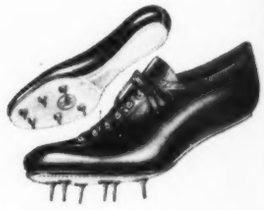

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SCHOLASTIC COACH

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IN THIS ISSUE VOL. 9, No. 5

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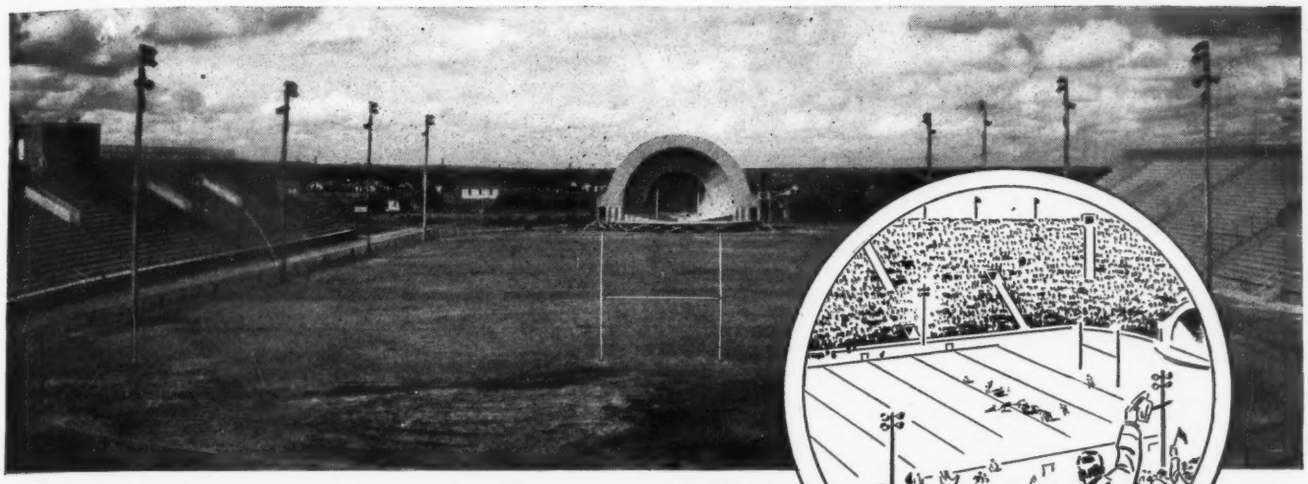

Let them *Hear..* as well as *See!*

Spectators of games, track meets, musical concerts and pageants at Taft Stadium, Oklahoma City, Okla. (top of page) get double enjoyment by hearing what takes place on the field—as well as seeing the action. This stadium is equipped with an RCA Victor Public Address System with speakers mounted on the poles shown on both sides of the field. (Above) Close-up of RCA speaker similar to those in use at Taft Stadium.

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Here Below

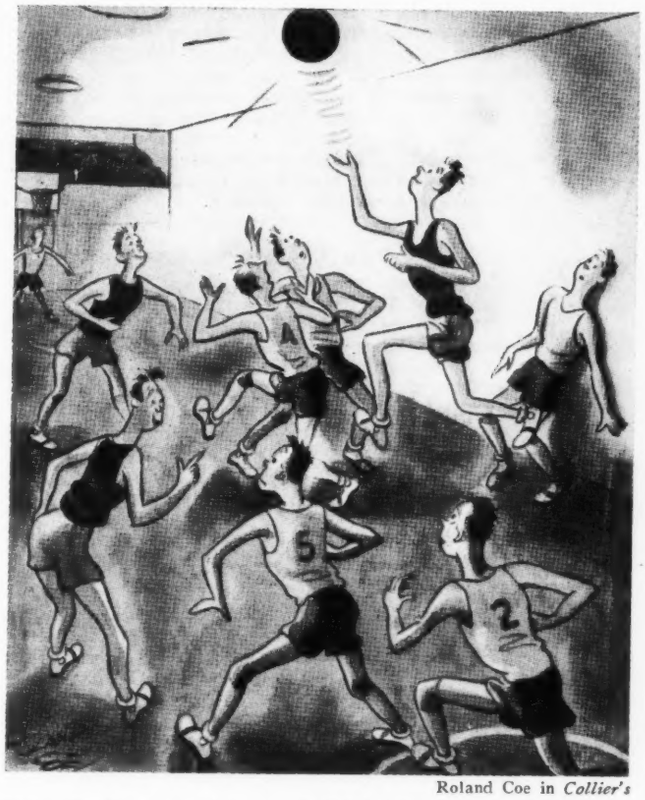
YOU can't walk a millimeter these days without falling into the clutches of a January morning quarterback who will take you on a verbal expedition over every inch of Southern California's 85-yard march against Tennessee, or who will perhaps take a few cerebral cracks at the Tulane line with Kimbrough. Exciting though the Bowl games were, we still think the greatest post - season game of 1939 was the game that was *not* played between Miami High School and Seward High School of New York City.

Early in December, unbeaten-untied Miami invited unbeaten-untied Seward to the Orange Bowl for a Christmas Day game for the Infantile Paralysis Fund. With the whole country to draw from, Miami had to pick a team that could not possibly go because of state rulings. The State Board holds that a high school football team cannot play more than seven games a season, that a season must be completed before December 1 and that no team can travel more than 100 miles for a contest.

When some of the local sportswriters heard about these regulations, they let out a bleat you could hear in the Rose Bowl. They called the code a plot to undermine athletics as an integral part of American life in general. What was the matter with those "heartless" educators? Didn't they have any "notions of sentiment, of human feeling for the youngsters of the sidewalks?" How could they deprive the Dead End Zone Kids of a trip to the Everglades, the Fountain of Youth and the Old Spanish Missions, to say nothing of the Orange Bowl? Are we going to let them get away with it? No! So the sportswriters ran to the Mayor, the Governor and the Marines.

But the rules remained the rules, even though nobody bothered to read or try to understand them. To the everlasting credit of the State Board, they refused to retreat before the pressure brought to bear upon them from the outside. They had drafted a code for a safe and sane inter-high school athletic program, and they intended to stick by their guns.

When it became obvious that Seward would be unable to make the trip, one of the local papers offered to send an all-star team in its place. The idea was to get around the rules by sending the all-stars as individuals, with the approval of their parents and coaches. But this scheme was also spiked by the code of regulations. Finally, over the almost prostrate bodies of the sport page bloc, Miami withdrew its invitation and gave it to a school in another state.



Roland Coe in *Collier's*

"He finds it easier to dribble from the ceiling!"

The men who led the crusade against the so-called "killjoy" regulations, have promised to tear apart the entire scheme of stifling scholastic gridiron competition. By next Christmas we will have a Bowl game in every high school pot.

WHILE thousands of high school and college teams were getting ready to raise the curtain on the 1939-40 basketball season, the Last Curtain was rung down on the man who had made it all possible, Dr. James A. Naismith. A man little known by name to the average person, his influence on athletics was as profound and far-reaching as that of any other figure in the history of sports.

Dr. Naismith was an inventor in every sense of the word. He did not simply organize or develop an older type of game. He actually *made* a game. It was separate, distinct, unique—and wholly American.

Dr. Naismith was a young physical director of 27, when in 1891, at Springfield (Mass.) Y. M. C. A., he nailed two peach baskets to the side of the track and egged the boys into throwing a soccer ball at the targets. The thing was done in an effort to find some sort of employment for a group of football players who, out of sheer boredom, were beginning to tear the place apart. The Massachusetts winters are long and rigorous; and the football men, easily bored with education, had taken to such things as yanking the bell out of the chapel tower and setting fire to the English building. In this crisis, Dr. Naismith invented basketball.

Because there were eighteen men involved, the game originally had nine men to a side. The boys used a soccer ball and a wooden peach basket. After a goal, they took the ball out of the basket and started over again. When they raised the basket to the edge of the balcony railing, they bored a hole in the bottom of the basket and poked the ball out at the top with a stick. Later they had an iron ring and still later the cord basket.

In later years, the Great Inventor liked to look back, and with a mischievous twinkle in his eye, point out that despite all the great advances of the game, 12 of the original 13 rules were still in use. At 78, still keen and mentally and physically alert, he used to grumble good-naturedly about the trends his little game were taking. Among the things he did not like were the modern style of dribbling, the zone defense, the roughness and the abolition of the center tap.

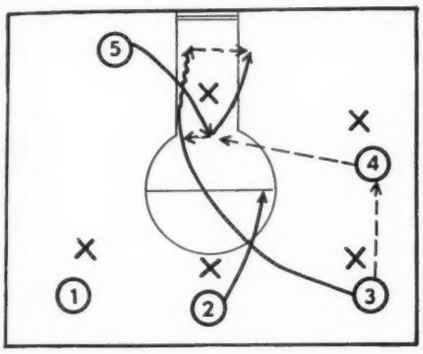
ST. JOHN'S FREE-STYLE OFFENSE

Set plays play a minor role in this pattern; the boys are given their freedom to cope with situations as they develop

By Joe Lapchick

Joe Lapchick, coach at St. John's University (N. Y.), will always be remembered as the center on probably the greatest basketball team of all time, the Original Celtics. He spent 14 of his 23 years in professional basketball, feeding the tap to such wizards of the hardwood as Nat Holman, Johnny Beckman, Dutch Dehnert, Dave Barry, and other members of the Celtics. He also operated for three seasons with the famous Cleveland Rosenblums, during which time the team won two American League championships. Finally, in 1936, the 6 ft. 5 in. giant packed away his shin guards and took over the reins at St. John's. A great player, he quickly proved himself a great coach. After several seasons of good, if not sensational, success he produced a team last season which probably ranked with the five best in the country.

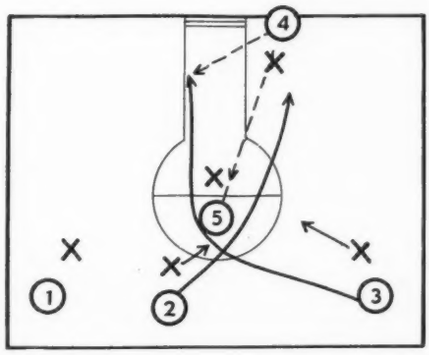
ON OFFENSE every basketball team worth its salt employs some preconceived method of working the ball into the basket. The attack may move along very definitely fixed paths or it may be constructed with freedom for individual action as the *motif*.



Diag. 1

There is no definite set-up on this play. The pattern is given to the players as an option when the situation arises spontaneously. As 5 drops into the "bucket," 3 whips a pass to 4 and 2 starts cutting to his right. 3 then cuts behind 2, using him as a moving screen, and 4 rifles the ball into the pivot. 3 drives all the way around 5, who "gives" the ball and pivots away from the play. If the simultaneous pass and pivot does not succeed in drawing X5 away from the cutter, and X5 switches, 3 may whip the ball back to 5.

There has always been some disagreement as to how specific the pattern should be. There are men who will argue that a grooved attack discourages individual initiative and is too easily hamstrung by a well-planned defense. Even the staunchest advocate of systematic basketball cannot deny that a zone defense, for example, is anathema to any form of screen attack. Against a team that plays the ball rather than the man, even the most beautifully-timed set plays are not worth a straw



Diag. 2

What few set plays we have are based on out-of-bounds and jump-ball situations. We use the accompanying play when we have an out-of-bounds throw-in under our own basket. 2 is a decoy and starts the ball rolling with a drive around the pivot man. 3 crosses behind him, races around the other side of the pivot and takes the pass from 4. The criss-cross action of the cutters may force X2 and X3 into a bump, or into the stationary screen created by 5. If X5 switches to 3, the ball may be passed directly to 5 for a short shot. 1 is the team's deadliest shot. If none of the preferred openings have materialized, the ball is passed out to him for a possible shot. On occasions he may drop into the 2 spot, especially when X2 and X3 fall back to keep everything in front of them. In this contingency, 1 (in the 2 spot) fakes a cut around 5, drops back quickly, takes a pass from the out-of-bounds man, and shoots.

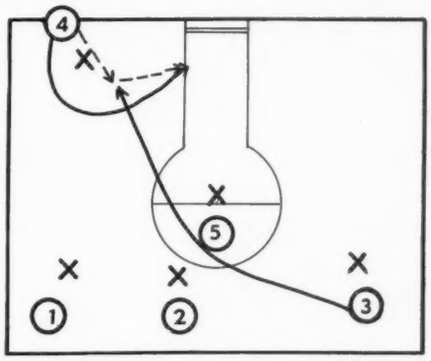
On the other hand, there are legion of those who believe in systematic coordination, and play the game according to the prescribed formula of some system. They contend that a set mode of attack is essential in high school basketball. Schoolboys have neither the basketball intelligence nor the experience to go 32 minutes on their own. They need a well-organized offense, calling for the movement of players to certain areas under certain situations and conditions. If the set offense does nothing else, it prevents them from becoming careless or wild in their playing.

Hence, the question as to which is the better system—the set style with plays or the style which depends on the players to create their own scoring opportunities — may hinge around personnel. At St. John's we pin our faith to a large extent on the resourcefulness of the players. We stress fundamentals with particular emphasis on fast, accurate passing and quick breaks. Everybody moves and everybody is a potential scorer.

Set plays do not play a very important part in this pattern. We have something special for jump-ball and out-of-bound situations (see diagrams), but by far and large the players are given their freedom to cope with situations as they come up.

We can do this in New York City. Our average player starts playing basketball at a very tender age. By the time he arrives at college, he has had a diversified basketball education in playgrounds, community centers, church leagues, elementary schools, and high schools. He has learned his way around the court and he has picked up most of the tricks of the trade.

The big job that remains is to polish him up, correct his flaws and to work him in with the team. During our pre-season practice sessions, the boys are drilled extensively on



Diag. 3

When the ball is taken out-of-bounds closer to the sideline, the boys try to "do business" with something like this. 3 races diagonally across the free-throw lane to a spot a few feet behind and on the inside of X4. 4 flips him a short pass and comes out immediately. He swings around 3 in a hook, and takes a short pass for a "cripple" shot.

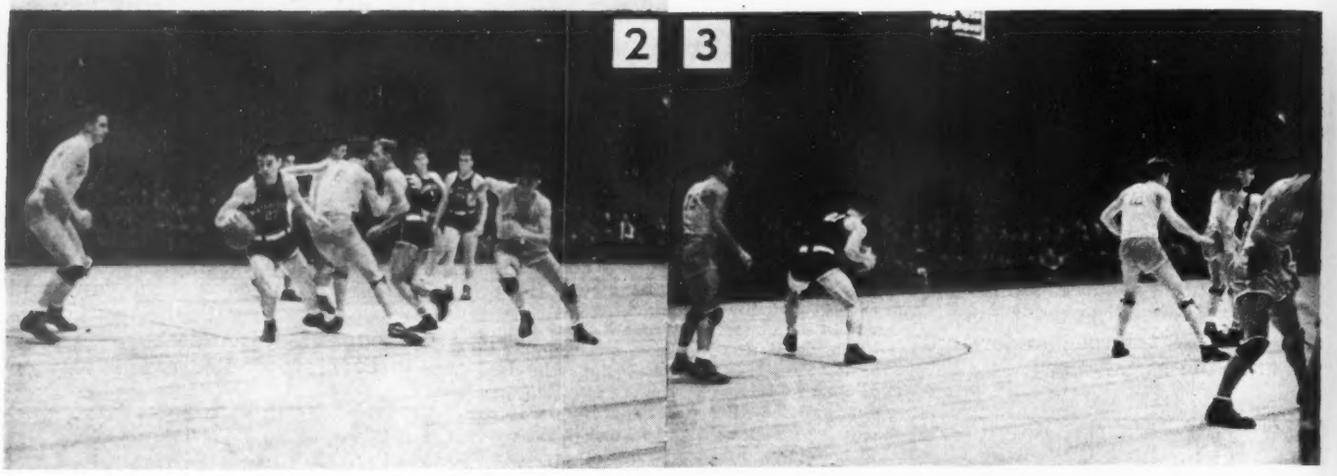
the fast pass, constant circulation game. They soon get the feel of each other and learn all there is to know about each other's game.

One point is continually stressed in this drilling: the ball should not be bounced before passing. Many players have a habit of taking a short bounce before passing off to a teammate. The bounce is purposeless and often exposes them to danger. If nobody is on the spot to help out the bouncer, an alert guard may close in and tie up the ball. As a rule, the ball-handler should never put the ball on the floor. This way

(Continued on page 36)

Pivot Play

In common with other local colleges, St. John's plays practically all its big games in Madison Square Garden. Since the invading teams represent every basketball milieu in the country, the metropolitan fives "see" a heterogeneous assortment of offenses during the course of a season. The pictures on the next two pages are actual game shots from three of our intersectional games last year. In Northwestern (pictures Nos. 1-6), St. John's faced a good ball-handling team which set up with a man on the pivot. Our center had his hands full guarding this versatile fellow. After setting up (No. 1), he might pivot and dribble in (No. 2), take a step out and shoot with a peculiar hook-like motion that was very difficult to stop (No. 3), or act as a springboard for several good sideline plays (see pictures below). The fact that the man was able to shoot effectively off the pivot kept the guard close, which may have contributed to his failure to see the switch setup in the following pictures.

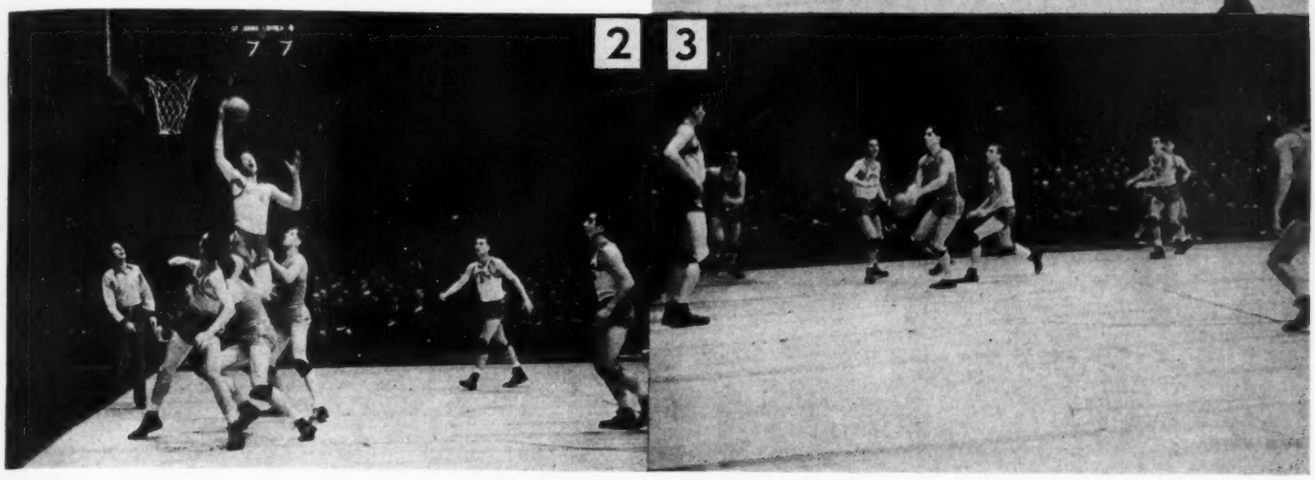


Sideline Screen

In our practice work on defense, we devote a lot of time to switching tactics, with the result that year in and year out St. John's is usually a good switching team. The 1938-39 team was no exception—the boys knew how and when to switch. Hence, it was a surprise to see how effectively Northwestern was able to screen them out. Pictures 4-6 outline three stages of a play that actually worked for a basket. In Nos. 4 and 5 the ball is jockeyed along the sideline while the pivot drops into position. A decoy (not shown in the pictures) sets the stage for the final "putsch"—a drive down the outside by the player in the background of the fifth picture directly facing the camera. The last picture shows him taking a one-hand hook pass from the pivot. The cutter, George Voigts, an all-American football player on the side, had terrific drive and scored three baskets in a row on this play. The situation obviously called for a switch by the man guarding the pivot.

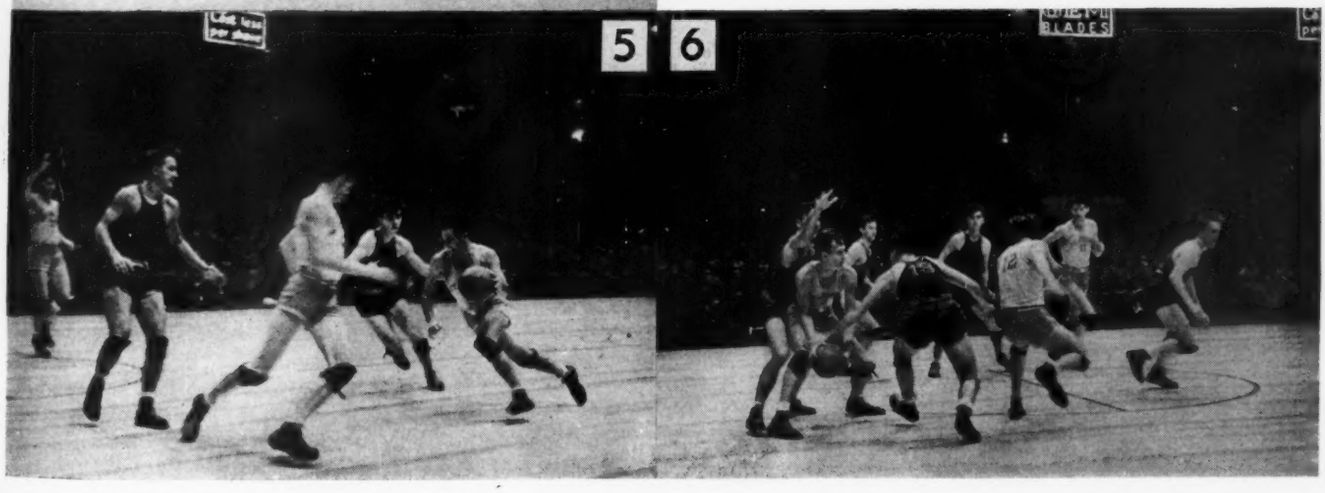
One-Man Circus

Practice though you may on situations approximating game conditions, someone like Mike Novak of Loyola will come along and show you something you've never seen before. The 6 ft. 9 in., 220-pound giant defeated St. John's almost single-handed last year. On offense, he would set up on either side of the free-throw lane and keep moving from one side to the other while his teammates in the backcourt jockeyed the ball. At the right time, the ball would be whipped into him and the attack would develop in earnest. Mike might pass right out again, feed a cutter or pivot and shoot, as shown in the first picture. He was "on" against us and sank six baskets with this shot alone. On defense, Novak parked under the basket (third picture) and watched the game almost disinterestedly while his teammates bustled around in a zone. But once an opponent shot, Mike sprang into action. He leaped high in the air and speared the ball before it cleared the rim (second picture).



Finer Points

The accompanying shots show some of the fine individual craftsmanship that marked the St. John's-St. Joseph's game. The first picture (No. 4) shows a St. Joe man getting off his feet for a set shot. The guard does not turn his head to follow the flight of the ball, but stays with his man, making it necessary for the shooter to take a circuitous path for the rebound. In the fifth picture, Ralph Dolgoff of St. John's is trying to get in with a low, driving dribble. A natural right-hander, Dolgoff is dribbling with his left hand in order to keep his body between the guard and the ball. His teammate is trying to draw the other St. Joe player away from the dribbler, but the guard hesitates and is ready to switch over should this tactic be necessary. In the last picture an offensive player has just attempted to lose his man on the ball-handler. The guard makes a smart play. He slides in between the pivot and his man, and stabs at the ball in passing.



PLANNING A NEW LIGHTING SYSTEM

The number and location of the lamps are determined by the available mounting height

By John T. Bailey

John T. Bailey is an electrical lighting engineer in the Westinghouse Lamp Division at Bloomfield, N. J.

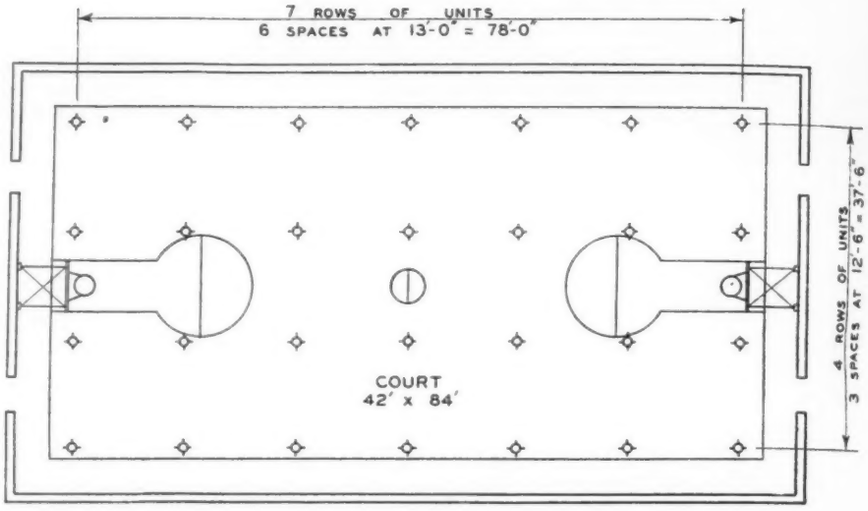
ALWAYS, at some stage of the scholastic coach's career, the need for better illumination in the gymnasium becomes apparent. This is inevitably true because lighting standards are always moving forward, due to a better understanding of the important relationship existing between sight and light. Light is the indispensable agent of sight for without it our sense of vision would be worthless.

In the gymnasium, where the trajectory and the speed of fast-moving objects must be judged instantaneously, seeing must be performed accurately and quickly. High levels of illumination enable the players to coordinate their actions and their visual sensations, with the result that a better game is played. Unfortunately, the *cost* of installation has a tendency to give many school men sub-standard ideas on the question of what constitutes *adequate* illumination. Nevertheless, progress is being made in the right direction due to reduced lighting costs and a greater appreciation of the advantages to be gained from the higher lighting standards.

Thus, experience has shown that lighting systems, which were at one time considered adequate on the basis of the national average, do become obsolete. Furthermore there is no indication that there will be a remedy for this problem in the near future.

Such is the situation that many coaches are faced with today—what to do about better lighting. The school governing body may look to its coach for suggestions and recommendations regarding possible revisions in the present lighting. The coach, in turn, not being an electrical engineer, must rely upon the advice of electricians or contractors who may be competing for the work. The following facts and information, expressed in ordinary terms, are directed to the attention of coaches in order that they may more intelligently select a better lighting system for the small gymnasium.

First, let us consider a typical gymnasium which will accommodate an optimum basketball court 42 by 84 feet. The clear height to the ceiling or trusses will vary considerably. Consequently, the mounting height of the lighting units above the floor is not uniform for all gymnasiums. This consideration has an important bearing on the lighting system, as we shall see presently.

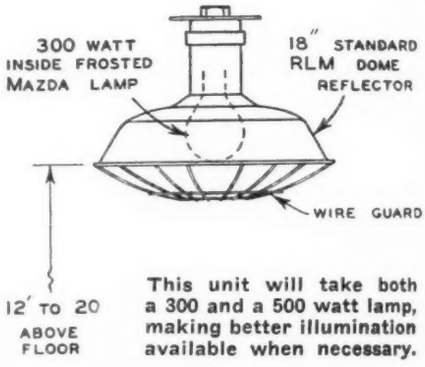


A recommended lighting layout for a small gymnasium with a low ceiling.

Naturally, when modernizing, every consideration will be given to salvaging as much of the present system as possible. The school's first thought is, "Why can't we use larger wattage lamps in our present fixtures?" The answer will usually be found in one or all of these limitations:

1. It is probably physically impossible to insert a larger sized lamp bulb in the fixture, because of the increased bulb diameter or because the present socket will not take the base of the proposed lamp. (Lamps change at 300 watts from the medium screw base to the mogul screw base.)

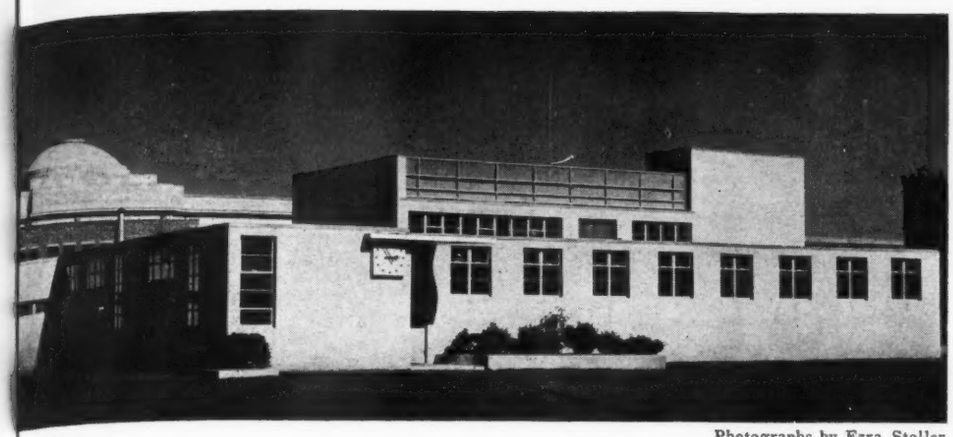
2. If a larger lamp can be inserted the results may be unsatisfactory because: (a) The fixture may not have sufficient ventilation to dissipate the increased heat generated by the larger lamp. (b) The brightness of the lamp and fixture may be increased to such a point as to create conditions of glare which may seriously interfere with vision. (c) The distribution of light from this misfit of lamp and fixture may be sufficiently altered as to be no longer suited to the proportions of the room. (d) The over-all efficiency of the larger lamp-present fixture combination may decrease because of improper positioning of the lamp in the fixture. (e) The present wiring system may not have sufficient capacity to allow the operation of larger lamps at their rated voltage, which will mean wasted power consumption in the wires and perhaps the generation of less light than with the old lamps—not to mention the fire hazard resulting from overloaded wires.



This unit will take both a 300 and a 500 watt lamp, making better illumination available when necessary.

It can be readily seen that an attempt to get more light from the present system is apt to be discouraging, unless the gymnasium lighting system was installed with the possibility of future additions in mind. Whether or not it was, can be determined by any competent electrician, contractor or the local utility. If it was, the solution is simple; if it was not, then the proper course is to start all over, bearing in mind that even though the present standards of lighting are adequately met by your new system, it too will need

(Continued on page 30)



Photographs by Ezra Stoller

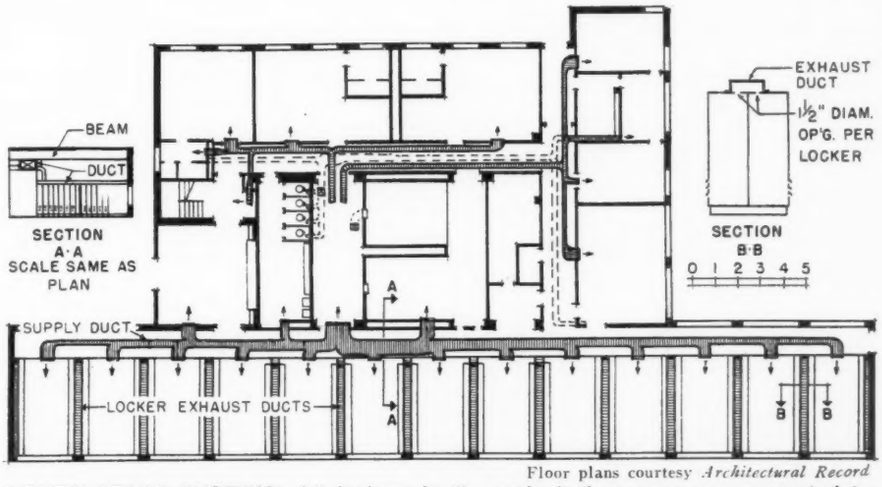
NEW M.I.T. FIELD HOUSE

THE ultra modern field house at the Massachusetts Institute of Technology in Cambridge is the first of several buildings which are to make up an athletic center.

The main locker room accommodates 450 men: plenty of locker space was needed because the Institute's curriculum does not permit the distribution of practice periods throughout the day. The room is divided into 13 alcolves formed by tiers of lockers. Each alcove is lighted by a 5 by 10-ft window in the east wall, high enough to afford privacy without the use of obscure glass. Although generous in capacity, the lockers are low in height, which gives a light and open character to the room. Walls are gray, lockers red.

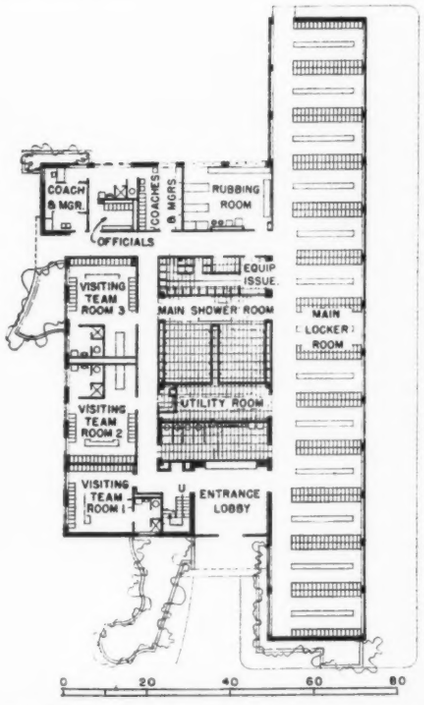
The main shower and toilet rooms have been placed in the center of the building for easy accessibility from both the visiting-team rooms and the main locker room. This location also makes it possible for the plumbing to be concentrated on either side of a central utility space. The ceiling of this central section has been set higher than ceilings of adjacent areas, and windows in the clerestory wall thus formed give adequate light.

All lockers in the main locker room are connected to an exhaust ventilating system, assuring continuous removal of odors and rapid drying of equipment. All services in the building are concealed in furred spaces.



Floor plans courtesy *Architectural Record*

VENTILATING SYSTEM: All lockers in the main locker room are connected to an exhaust ventilating system, assuring the continuous removal of odors and the rapid drying of equipment. The clerestory wall is used for air intake and exhaust.



FLOOR PLAN: The main shower and toilet rooms have been centrally located for easy accessibility from both the visitors' and the home team's quarters.

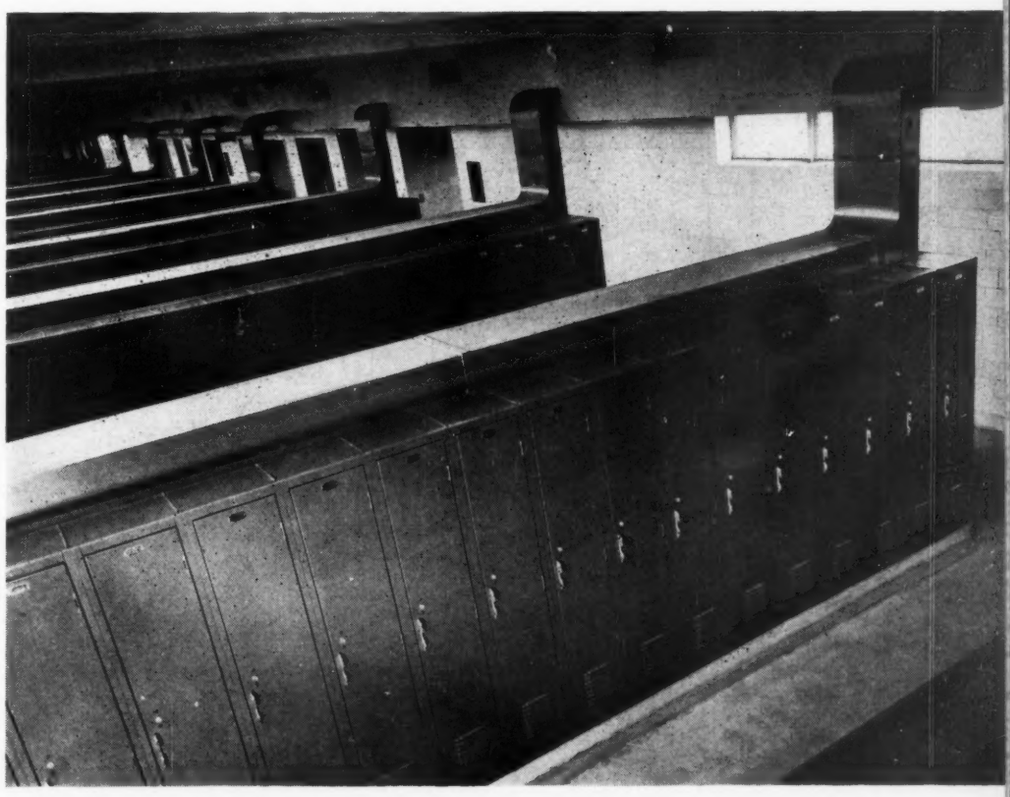
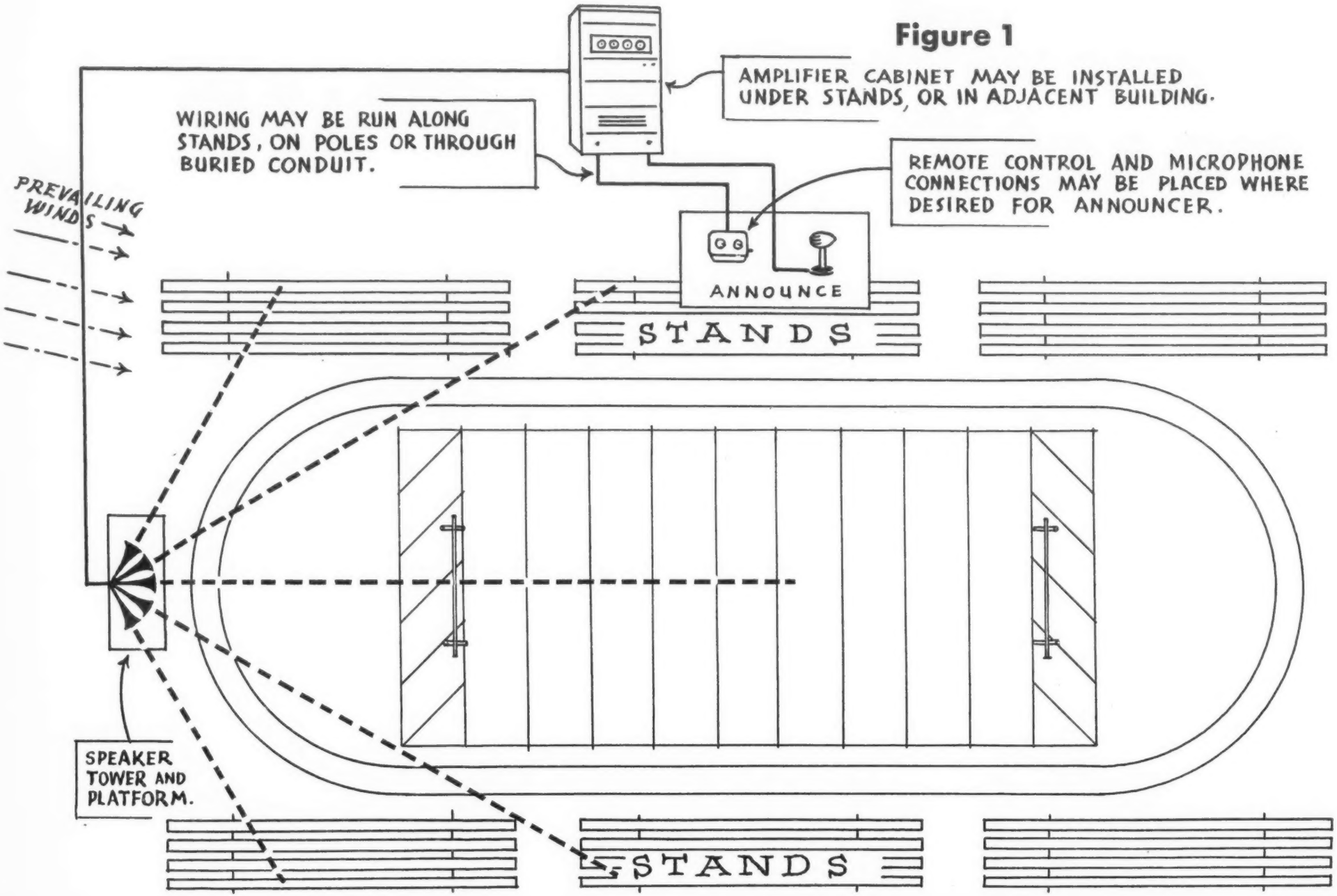


Figure 1


AMPLIFIER CABINET MAY BE INSTALLED UNDER STANDS, OR IN ADJACENT BUILDING.
WIRING MAY BE RUN ALONG STANDS, ON POLES OR THROUGH BURIED CONDUIT.
REMOTE CONTROL AND MICROPHONE CONNECTIONS MAY BE PLACED WHERE DESIRED FOR ANNOUNCER.
PREVAILING WINDS
ANNOUNCE
STANDS
STANDS
SPEAKER TOWER AND PLATFORM.

GYMNASIUM AND FIELD SOUND SYSTEMS

By O. V. Swisher

The indoor unit generally requires far less amplifier power than the unit out of doors

AN ADEQUATE sound system, properly and permanently installed, is indispensable to the full enjoyment of the game whether it is held in the stadium, gymnasium, swimming pool or on the track. With the iron "lung" on the job, every seat in the house is a ringside seat. As long as the spectator can see very well, he will have no trouble following the game.

However, we are not concerned here with the possibilities of sound units, which are legion. Our purpose is to describe some of the types of equipment and methods of installation which have proven their worth in some of the largest athletic plants in the country.

Perhaps the most elaborate type of setup is required for stadiums. Under outdoor conditions, the ingenuity of the sound engineers is taxed to the utmost to provide intelligible voice reenforcement for the entire field and seating section. The selection of the unit must be made with care. It must be capable of withstanding all adverse weather conditions, and it should be designed with an eye to the size of the audience to be reached, the distance sound is to be projected, the sound source, the outdoor space limitations, and the portability requirements.

Figure 1 shows a stadium of average size, seating from 5,000 to 8,000 spectators, together with the proper arrangement of sound equipment. The projector loudspeakers are of the metal horn type, with resinous diaphragms and permanent magnet fields. They have been selected because: (1) They may be easily mounted. (2) They are weatherproof. (3) They permit careful direction. (4) They will withstand great power. (5) They are rugged and sturdily constructed.

A wooden or metal platform, at least equal in height to the stands or bleachers, should be placed at one end of the field, on the side the prevailing winds come from. The projector loudspeakers are mounted on this tower so that the speaker bells form an arc. With this type of speaker, the angle of distribution for penetrating voice projection is approximately 30 degrees.

Since the tower is generally located a short distance back of the ends of the stands, we usually must provide sound projection over an arc of about 150 degrees. On the basis of 30 degrees projection per speaker, we will need five such speakers to cover the complete range. In mounting the speakers for proper projection, the arc to be covered is laid out as shown in Figure 1.

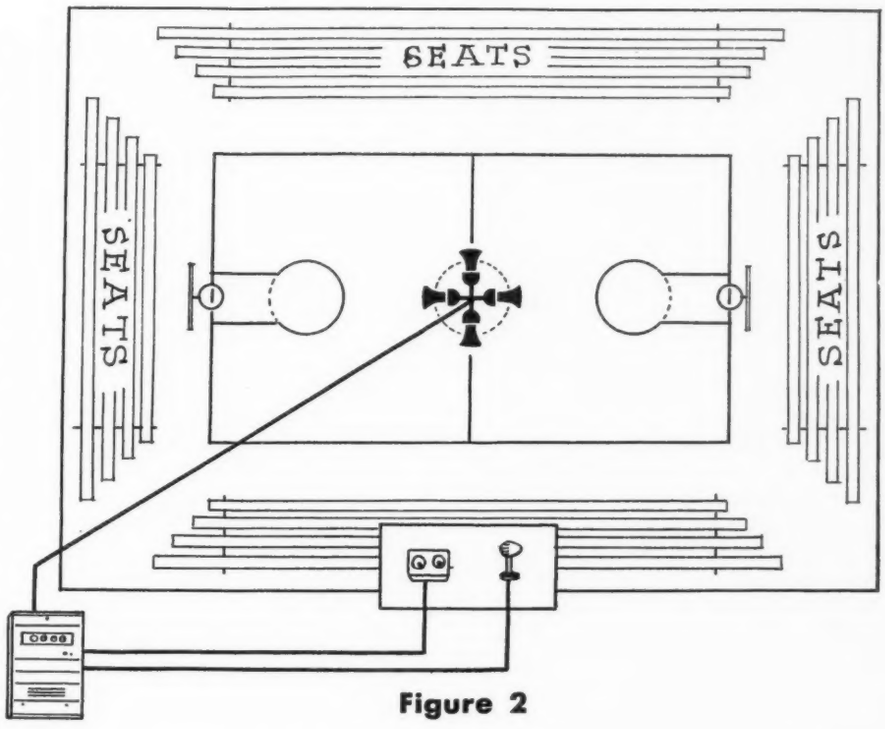


Figure 2

An amplifier of at least 100 watts power output, together with suitable control facilities, all housed in a wall-type metal cabinet, may be placed in a room, locker or storage space under the stands. Where the school building is adjacent to the field, the amplifier may be installed in a locker or closet within the school building.

Remote volume control connections, as well as microphone connections, may be run from the amplifier to the sidelines, stands, press box or to any position from which announcements are to be made. A record playing attachment may be added to the amplifier to provide incidental recorded music during intermissions.

Wiring for remote volume control, and microphone connections between the amplifier and the announcing positions, should be run in twisted lead sheathed wire. The wire may be run through rigid steel conduit or it may run exposed along the underside of the stands, depending entirely on the possibility of mechanical damage through being struck, stepped on, etc. The wiring between the amplifier and loudspeakers should be twisted weatherproofed telephone wire. This connection may also be run in either rigid conduit or exposed along the underside of the stands.

The selection of proper microphones is naturally an important consideration. The school or engineer should select a microphone which is designed especially for announcement work. The "mike" should be completely weatherproof and designed with careful consideration to feed-back problems.

Gym or pool units

Sound reenforcing equipment for the gymnasium and swimming pool is essentially the same as the equipment already described. However, much less amplifier power is generally required, and it is possible to use one of several types of loudspeakers. The selection, of course, depends upon room acoustics and seating arrangements. Generally an amplifier of 25 or 50 watts, housed in a cabinet suitable for shelf or wall mounting, will provide adequate power for any gym or pool.

Figure 2 shows one method of arranging loudspeakers for the gym. Directional wood or metal type

(Concluded on page 31)

BUILDING A CINDER RUNNING TRACK

By John J. Mundinger

Good drainage, firm footing and a compacted surface should be the main objectives in the construction

John J. Mundinger, supervising engineer for the Louisiana State University, designed and constructed the quarter-mile cinder running track that has made L.S.U. one of the country's choice spots for outdoor meets. His article is a condensation of a brochure which was prepared in 1938 in response to numerous requests for information, plans and specifications on the layout. A similar report by the author appeared in the December, 1938, issue of "Public Works."

AT THE time Louisiana State University decided to build a new cinder running track, there was little information on the subject to go by. Reliable data on methods of design and construction were very scarce and opinions differed widely, especially as to the type and texture of the final surfacing.

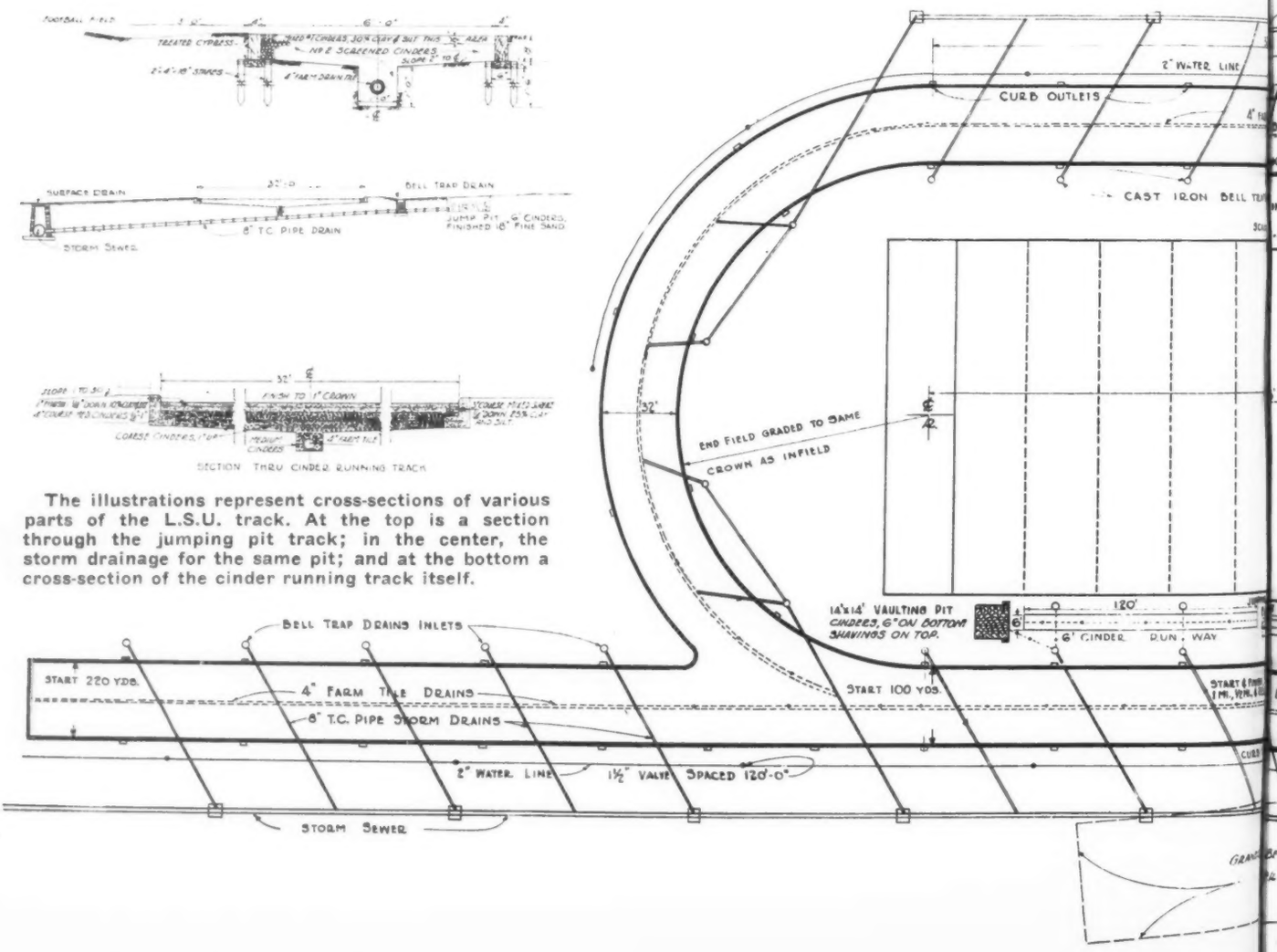
With few accepted standards to turn to, the engineering department had to depend on its own resources. After a fruitful consultation with Coach Bernie Moore and Athletic Director T. P. Heard, we laid our plans with three objectives in view: (1) Good drainage. (2) Firm but resilient footing. (3) A compacted surface, sufficiently hard to be fast, but not too hard to cause injury.

Good drainage was easily obtained by following accepted engineering practice with tile drainage and run-off for storm water. A bed of well graded cinders sufficiently deep and thoroughly compacted gave the desired footing. But the third feature was a more difficult proposition.

To obtain a compacted surface, we had to build an experimental track, 6 ft. wide and 200 ft. long, divided into 20 ft. sections, each of which was surfaced with a different mixture of fine cinders, clay, silt, and sand, using from 5% to 40% clay. It was almost the unanimous consensus of opinion that a mixture of fine cinders passing ¼ in. mesh mixed with 15% loamy clay and 10% river silt, gave the best results. Sections having less than 15% clay and silt were too soft, difficult to maintain and "slow." Sections containing more than 30% clay and silt, while very fast, became too hard and held water for too long a period after rainfall.

The cinders as purchased were screened by a power driven, rotary screen into three grades of cinders: No. 1, passing 5/16 in. mesh, 36%; No. 2, passing 1 in. mesh, 44%; and No. 3, retained on 1 in. mesh, 20%. To obtain a 12 in. total thickness, 2½ in. of the coarse No. 3 was placed on the subgrade and covered with a layer of approximately 1 in. No. 2 before being compacted. Care was taken not to compact too densely. Then the rest of No. 2 was added and rolled.

The final mixed course was placed in two layers, the first 3½ in. loose



The illustrations represent cross-sections of various parts of the L.S.U. track. At the top is a section through the jumping pit track; in the center, the storm drainage for the same pit; and at the bottom a cross-section of the cinder running track itself.

measurement. Both layers were gauged by the use of four 3½ in. set screed strips placed longitudinally. The lower surface layer consisted of the No. 1 cinders, 15% loamy clay, 10% river silt and 5 gallons of water per cubic yard of cinders, screeded on with an 8 in. channel iron 12 ft. long. The course was thoroughly rolled and used for several weeks before the final surface was laid; being wetted, broomed and rolled at frequent intervals.

The final surface layer was similar to the lower layer except that the amount of clay and silt was reduced by one-half and the screed strips were only 1 in. in thickness. Before this course was placed, the surface below was thoroughly scarified to a depth of at least 1 in. and sprinkled well with water.

For other geographical locations, there should be allowances for climatic conditions. Where deep freezing occurs, for example, make the cinder base thicker. In regions which have excessive rainfall the track must be equipped with additional drainage facilities. (Rain fall at Baton Rouge averages 60 in. a year and from 4 to 6 in. during one 24-hour period.)

Layout of track proper

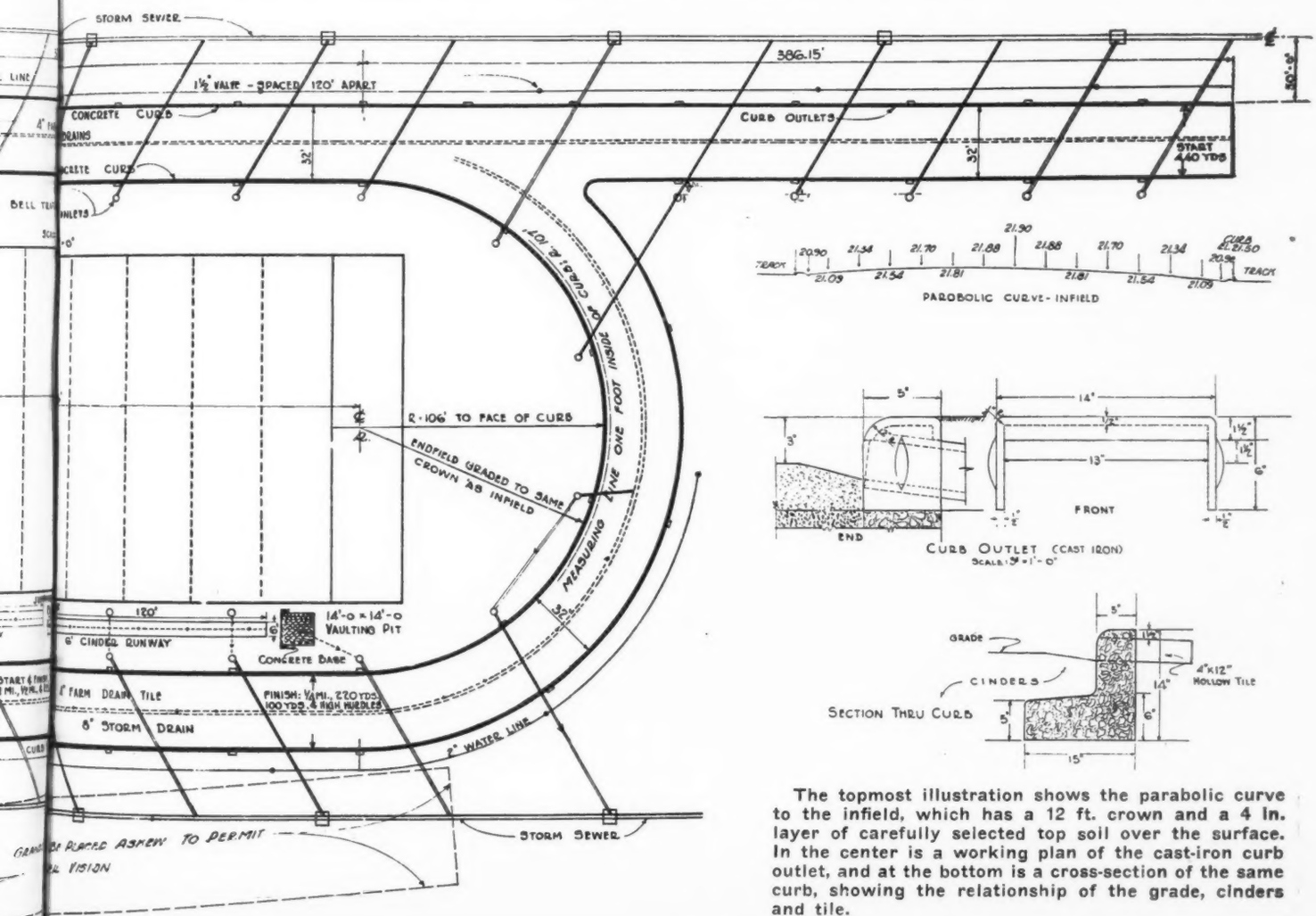
The engineering details of the track itself are shown in the accompanying layout. The track consists of a quarter-mile oval with chutes 32 ft. wide at diagonally opposite ends and a soft coal cinder surfacing approximately 12 in. thick. The chutes permit the quarter mile, 400 meters and the 400 meter hurdles events to make one turn and finish at a common point. During meets in which a large number of contestants participate, preliminary sprints and hurdles may be run out of both chutes by using temporary markers. The placing of the grandstand at an angle of approximately 10 degrees with the track, instead of parallel, increases the visibility for spectators during short sprints, hurdles and the finish of the longer runs.

The subgrade has a side slope of 2½ in. to the center, along which is laid 4 in. drain tile in a cinder-filled trench 12 in. wide and 12 in. deep. The tile drains are connected to 8 in. drains at 50 ft. intervals, which in turn lead to a storm drain. The cross drains also serve to remove storm water from the infield and adjacent football practice fields.

For the field events, there are two vaulting pits 14 by 14 ft. and 24 in. deep at the extreme ends of two runways, which are 120 ft. long and 6 ft. wide. In the center, and separating the runways, is a jumping pit 8 by 16 ft. long and 24 in. deep. The vaulting pits are tile drained, with a layer of 6 in. of cinders and 3 in. of sand on a bottom covered with shavings. The jumping pit is also tile drained with very fine sand for a cushion.

The infield, which is used for a practice football field as well as for field events, was graded accurately to a parabolic curve with a 12 in. crown, and a 4 in. uniform layer of carefully selected top soil over the surface. Best results were obtained by screeding the soil between screed strips 15 ft. apart instead of depending upon hand raking and leveling.

To kill any vegetation which might appear and act as a binding material, the track may be treated with a saturated solution of ordinary brine.



The topmost illustration shows the parabolic curve to the infield, which has a 12 ft. crown and a 4 in. layer of carefully selected top soil over the surface. In the center is a working plan of the cast-iron curb outlet, and at the bottom is a cross-section of the same curb, showing the relationship of the grade, cinders and tile.

Floodlighting Survey

By Ralph A. Piper

Ralph A. Piper, who is an assistant professor of physical education at the University of Minnesota, will be remembered as the author of an article last May, entitled, "The Country's Schools Are Lighting Up," in which he gave the results of a nation-wide survey he made on floodlighting. Since he will continue this study for another year, he will be pleased to correspond with any school in regard to its problems of lighting or administration.

NIGHT football is definitely on the upbeat in both high schools and colleges. Approximately 275 colleges scheduled home games at night in 1938, while 312 played night football during the past season. According to the Football Guide, over 25 percent of all college games in 1939 were played under nocturnal conditions.

Last year, as part of a study on the status and standards of night football, the writer attempted to determine the number of high schools which played home games at night, together with information on lighting equipment, operation and administrative problems. The study covered 530 public secondary schools located in 39 states and the District of Columbia.

The following conclusions were reached: average cost of installation, $3097.04; average kilowatt output, 60; average cost of operating lights per game, $9.23; and average increase in gate receipts, 212 percent.

The success of the study the first year encouraged the writer to keep the machinery in motion. Accordingly, another questionnaire on floodlighting was drawn up and circulated throughout the high schools. The latest questionnaire brought 225 replies, which swelled the total study returns to over 750.

Of special interest was the data supplied by the 31 schools which used floodlights for the first time. From the data on average kilowatt output, the 1939 reports indicate a trend toward better lighting systems. The average in 1939 was 67KW as compared to 60KW in 1938. Two of the new plants reported an alarmingly low kilowatt output of 15. To make up for this, however, two other new plants had 120KW and 144KW outputs. The replies indicated a definite tendency in the direction of the standard layouts recommended by lighting manufacturers and the National Electrical Manufacturers Association.

(Concluded on page 35)

INDIVIDUAL AND TEAM DEFENSE FOR GIRLS

The cardinal rule is to keep between the opponent and the basket, in a position to watch both the girl and the ball

By Viola Mitchell

This is the second of a series of three articles on girls' basketball by Viola Mitchell, who directs the department of physical education for women at Hanover College. Last month the author covered the fundamentals of individual offense. She continues with the technique of individual and team defense.

THE role of defense in basketball depends more or less on the individual coach. Some coaches attach a great deal of importance to it and devote almost as much time to the fundamentals of defense as they do to offense. Other women stress the theory that a good offense is the best defense.

Unfortunately, this is not so. An offense is an offense and a defense is a defense, and the twain should not be commingled. Develop an offense and develop a defense. You are bound to lose possession of the ball a considerable part of the time, and when you do you may call it whatever you choose, but to the practical-minded it is known as defense.

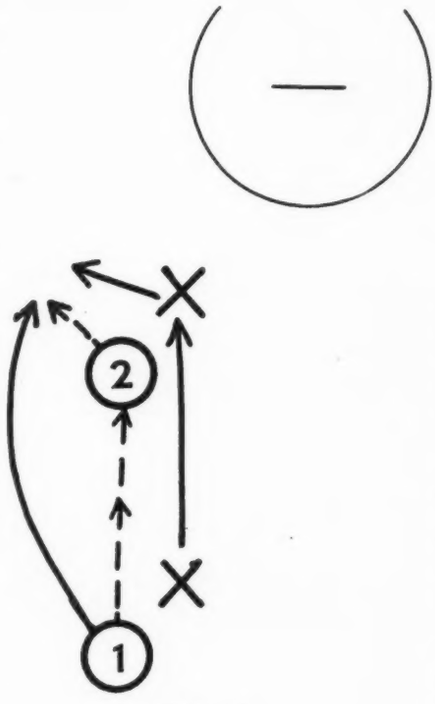
In the boys' game many coaches spend practically all their time on offense and let the defense take care of itself. The coach of the girls' team cannot possibly pursue the same course. Of her six players, three are defensive players in every sense of the word, who are not allowed to shoot. Consequently, practically all their practice time should be spent on defense. There is no need for the forwards to devote so much time to defense, since they must concentrate on offense. But they, too, should get a good schooling on the fundamentals of guarding. In fact, the dividends on intercepted passes are higher in the offensive half of the court than they are on the defensive side. Being in offensive territory, the forward can drive for the basket without wasting any time.

Each member of the team should spring quickly to defense once possession is lost. She should deploy in the best possible position to hamper the opponents as they work the ball down the court. Many times a lightning-like transition from offense to defense will smother the opponents' attack before it can really get under way.

Early in the game, the guard should acquaint herself with her opponent's style of play. Is she a good shooter? Does she use deceptive feints and fakes? Is she a hard driver? How fast is she? When these points have been determined, the guard may set her defense.

The cardinal rule of all defensive play is to keep between the opponent and the basket, in such a position that you can watch both the opponent and the ball. If it becomes impossible to watch the opponent and the ball at the same time, the guard should forget about the ball and concentrate upon the player. At the same time, however, she should never face her opponent; for face guarding is a foul, as well as a poor all-round position.

Many a guard has come to grief through turning her head to follow



Diag. 1

Man-to-man defense becomes difficult under conditions like these. To prevent a bump and at the same time keep the offensive players shackled, X2 must switch to 1 while X1 falls behind the pivot and ball-handling threat, 2.

the flight of the ball. An alert forward will seize this opportunity to cut for the basket down the guard's blind side. As a rule, the guard should play about five or six feet away from her opponent, depending upon the type of girl she is playing against. If the forward is a good long shot, it is best to give her less room and crowd her a bit. If she is fast and elusive, it may be best to play farther away and more to the inside, blocking the shortest route to the basket.

The guard's footwork is particularly important when the forward is jockeying around the court for position. In following her, the guard should avoid using cross-over steps or long striding steps whenever possible. This type of footwork throws the guard off-balance and prevents her from making quick stops and changes of direction.

The best step for general court coverage is the so-called first baseman's shuffle or boxing step. Instead of crossing her feet, the guard steps forward, sideward or backward with one foot and draws the other up to it with a sort of hopping motion. This type of footwork enables the guard to stick close to her opponent and to shift with her at every change of direction. The body is kept perfectly balanced and under complete control.

When the opponent secures possession of the ball, the guard should not rush in headlong and give the forward a perfect opportunity to get past her with a bounce or a pass and a cut. She should approach cautiously, keeping herself well under control and ready to take care of any offensive threat in either direction.

The body is crouched, the knees bent and the arms relaxed and slightly bent at the elbows. One arm is held high to create a mental hazard on shots and high passes, and the other is kept low for defense against a bounce or a low pass.

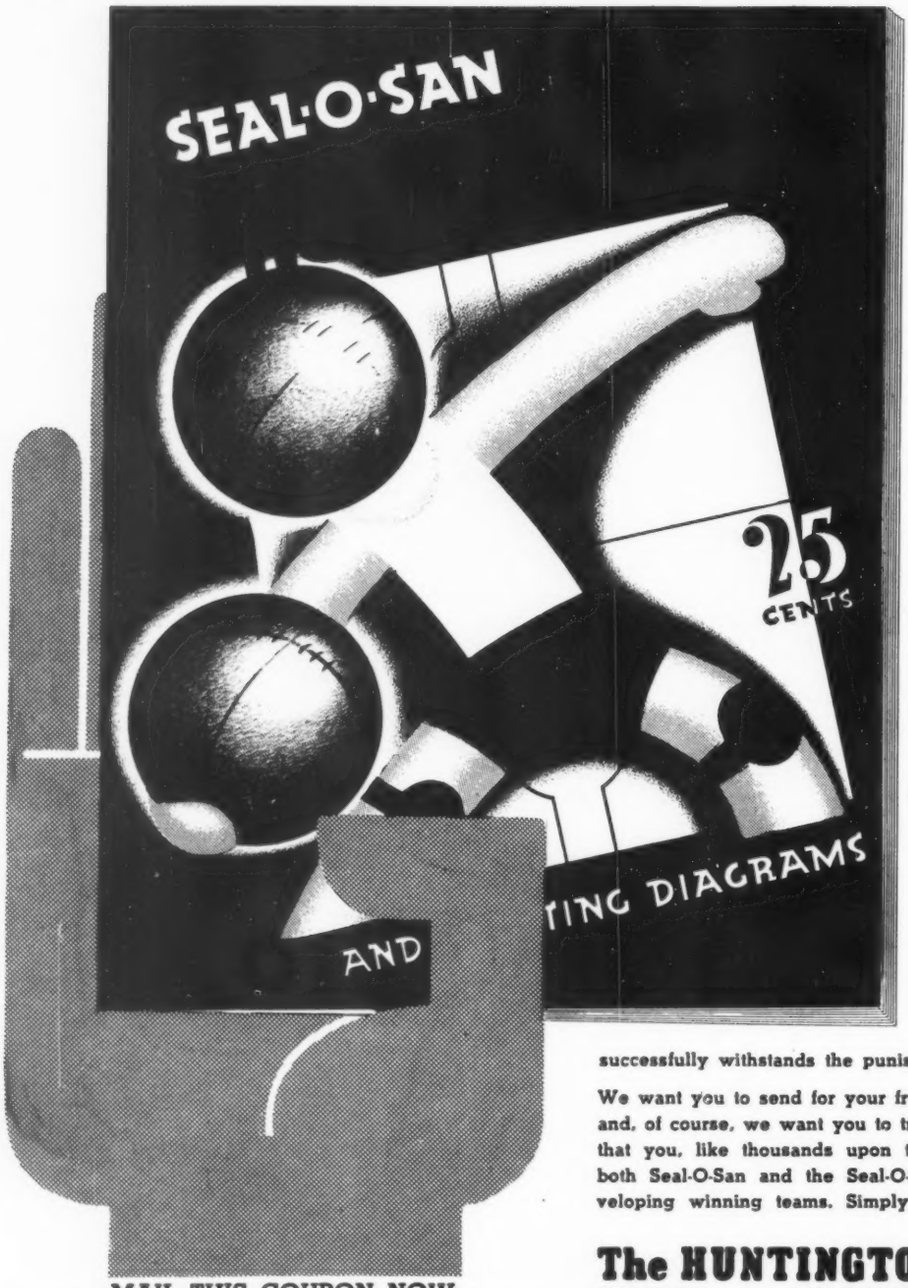
The distance to keep from a ball-handler depends upon her particular fortes. But it should rarely be less than three feet. A slow guard or a guard playing a very fast opponent, should play a little deeper to prevent her from using her speed to the best advantage. However, once the forward arrives within easy shooting distance of the basket, the guarding must be closer.

The guard should refuse to commit herself when the opponent fakes and her feet must move only with or after her opponent's. Only in rare emergencies is it desirable for the defense player to jump into the air to block a shot or a high pass. Very often the guard may be biting for a feint which will permit the forward to dribble in for an easy shot.

If the forward bounces, the guard should not stand flat-footed and slap at the ball as it goes past. She should make a quarter-turn and go

(Continued on page 34)

FREE! NEWEST AID TO COACHES



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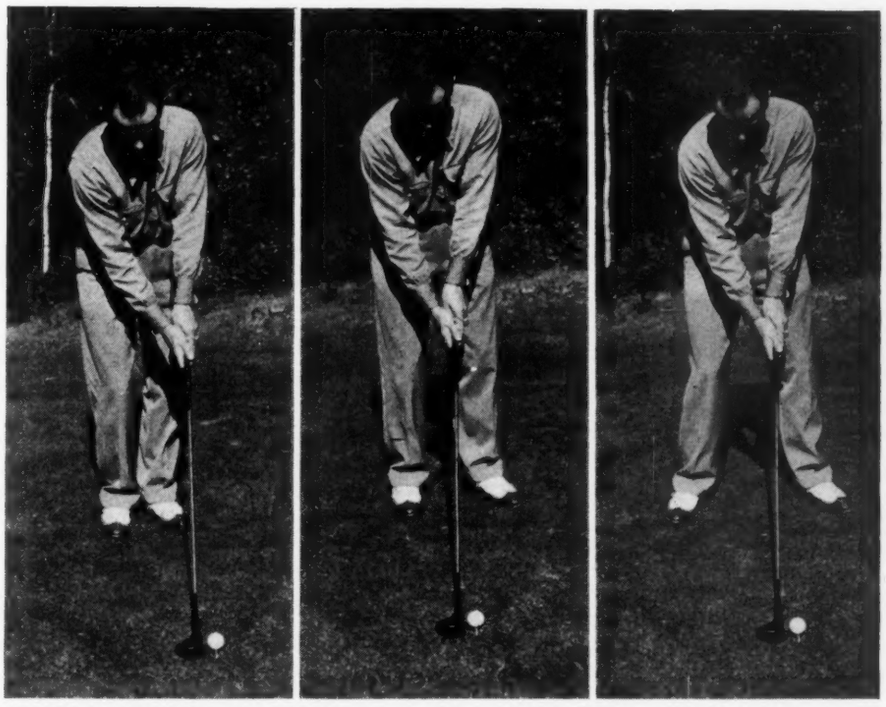
SEAL AND FINISH FOR GYMNASIUM FLOORS

A HIGH SCHOOL GOLF PROGRAM

By Ben Thomson

Mr. Thomson devotes the third installment of his series to the complete swing of the wood clubs

This is the third of a series of five instructional articles on golf by Ben Thomson, famous Yale University coach and author of the text, "How to Play Golf." The first installment stressed the values of golf and its place in the high school program, the second covered the grip and the stance, and the present installment is devoted to the complete swing of the wood clubs.



ADDRESSING THE BALL: From a position slightly back of the ball, the player places the face of the club directly at right angles to the line of play with the center of the club directly behind the ball. The left heel is then lined up with the ball and the right foot dropped back into its proper relationship to the left.

AFTER the instruction on grip and stance has been absorbed by the class, we are ready to take up the clubs. But with which one shall we begin? This has been a moot subject among golf instructors since the very beginning of the royal and ancient pastime. Some advocate the putter as the most elementary step; others put in a claim for the irons (mashie or an approaching iron); and still another school is all for one of the woods.

Each of these theories has its points, but from my own experience with a host of beginners I believe the full swing with a driver or brassie is the best bet. When a beginner picks up a club, no matter which one, he will immediately try a full swing. It is a natural instinct, and it seems sensible to humor it.

Therefore, I would begin with the full swing, using driver or brassie, and then proceed to the mashie, or as we now call it, the number 6 iron. The full swing develops every skill involved in the swinging of a golf club, and the mashie develops the sensitive touch so necessary in playing approach shots.

Correct demonstrations will accomplish what a great many words may fail to do. So before proceeding to teach the swing, I find it best to demonstrate it, so that the pupil may obtain a mental picture. At the same time, I choose my words carefully so that I will be clearly understood.

The swinging of any club is simple if the hands and arms assume easy control over the club, and the foot action assures a free body turn. The trouble with most beginners is that they are too right-hand conscious. Ask any right-handed beginner to swing a club, using only his left hand. His awkwardness will be very apparent.

Yet there is as much latent power in the left arm as there is in the right. It is only through constant use of the right hand and arm that more power is developed on this side. With use and exercise, the left side, too, may be built up to the same proportions.

The importance of this development program cannot be depreciated. The left arm controls not only the length of the swing but the speed as well. When the swing is accelerated beyond controlling range of the left arm, disaster usually follows. The power of control becomes vested in the right hand and arm, and nine times out of ten the ball will be hit improperly.

The backswing

The beginning of the backswing is very important. It is a full left-arm movement, from the shoulder on down to the hand, with the arm straight and the elbow only slightly relaxed to avoid stiffness.

As the club head is swung backward in a wide, upward arc, the complete left side—foot, knee, hip and shoulder—turn fully to the right until it is possible to look at the ball over the left shoulder. This movement is called "pivoting." Through it, centrifugal force is derived for the downswing. Pivoting should be carefully distinguished from "swaying," a disastrous habit with many beginners.

Correct and easy pivoting is the foundation of the golf swing, and no pains should be spared to master it. It holds the secret of distance and still more of straightness and accuracy.

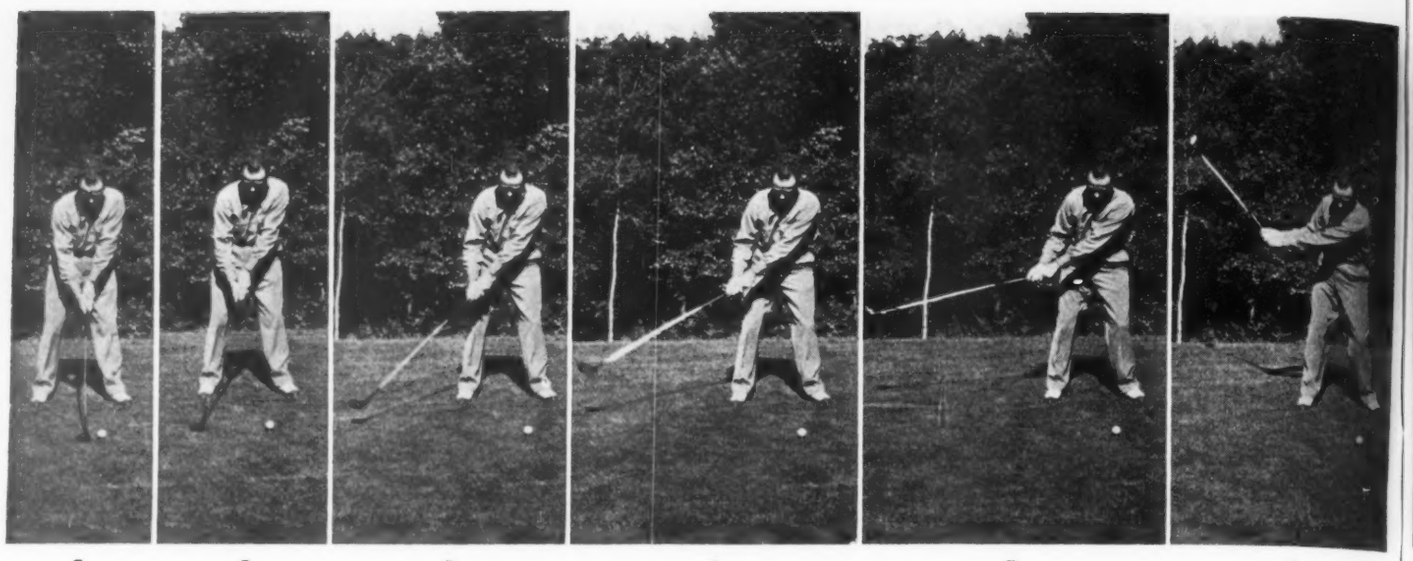
A combined movement of the left shoulder and left foot controls the complete pivoting of the left side. Without this foot-shoulder action, it would be impossible for the knee and hip to turn freely and fully to the right. The left heel rises off the ground, and the remaining weight on the left leg rests lightly between the ball of the foot and the big toe.

As the body turns, the left arm is gradually swung around and up, so that when the full turn has been completed the hands should be in a position just above the level of the right shoulder. At this point, the left arm should be comfortably straight and the right elbow away from the body, but pointing downward.

If the pupil should have difficulty in turning, or in keeping his left arm comfortably straight, immediately check the position of the left foot. He may be keeping too much weight on that member.

Thus far I have said nothing about the backward movement or break of the wrists. This break should come gradually as the arm nears the completion of the upswing. In this way there is less effort and more consistency in the cocking of the wrists.

(Continued on page 20)



1 2 3 4 5 6

ANALYSIS OF THE BACKSWING: This important phase of the swing is a full left-arm movement, from the shoulder on down to the hand. As the club head is swung backward, the complete left side—foot, knee, hip, and shoulder—is pivoted fully to the right until it is possible to look at the ball over the left shoulder. The left heel rises off the ground and most of the weight shifts to the rear leg. At the top of the backswing, the left arm is comfortably straight and the right elbow away from the body and pointing downwards.

(Continued from page 19)

There is no secret to good golf, but the correct position of the hands at the top of the backswing comes closest to it.

The speed of the club head as it swings into the ball comes in part from the "uncocking" of both hands in the downward motion. To hit the ball squarely, the face of the club must be kept open. The only easy way to keep the face open is to have both wrists cocked at the top of the swing. As the left side is turning, the right side turns with it, the weight shifting to the firm right leg.

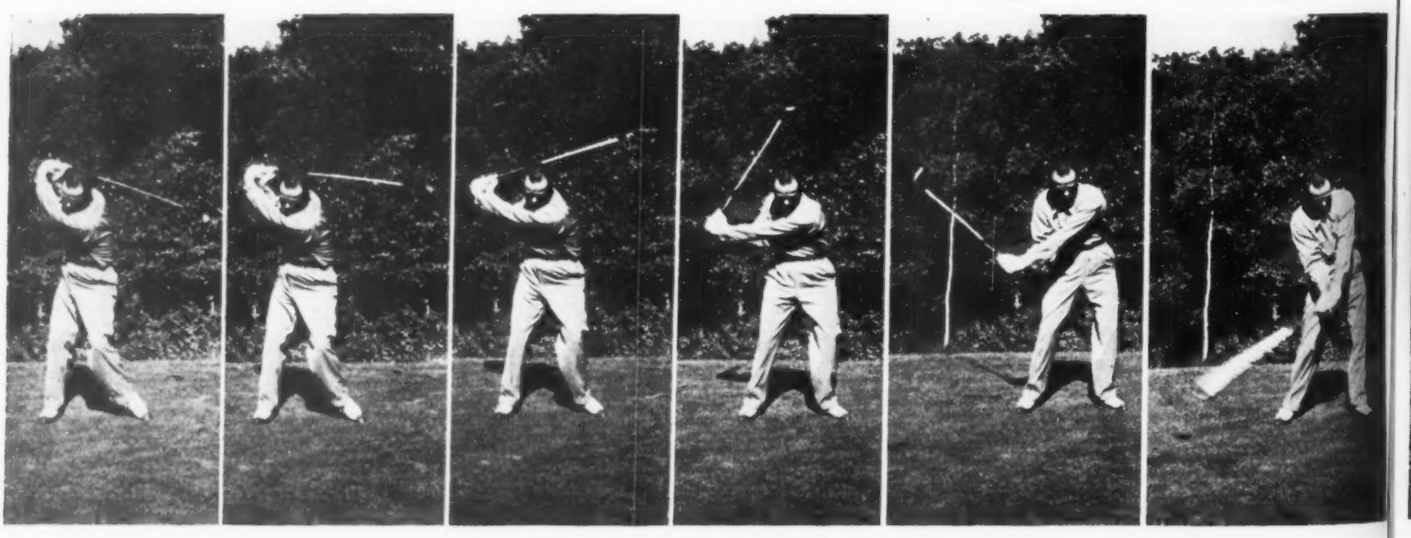
The beginning of the downswing is simply a downward movement of both arms with the left arm leading till the hands are about waist high. At the same time, the left heel goes back to the ground, so that the left side will be firm when the club head swings into the ball. Many players err at the beginning of the downswing by trying to develop speed by throwing the club head out at the top of the swing ("hitting from the top"). This forces the hands to uncock too soon, and by the time the club head reaches the ball the power and speed in the hands have been wasted.

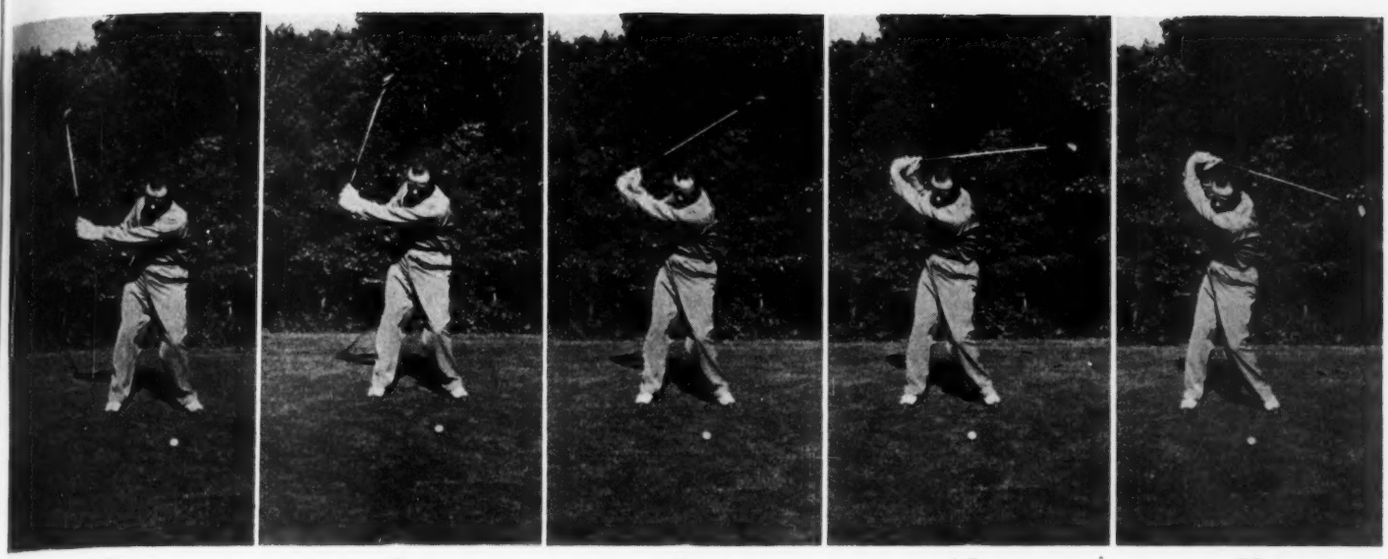
As both arms come down, the right elbow is kept fairly close to the body, so that the club head will descend in practically the same arc as was used in the upswing. When both hands reach a position almost waist high, the wrists uncock and reinforce the speed of the club head as it hits into the ball. In the meantime, as the club head swings on through, the right side of the body is turning to the left, with the shoulder down, so that it is possible at the end of the swing to look over it and see the spot the ball had occupied. The right knee is also turning inward to the left, and the weight of body is firm on the left leg and foot.

The face of the club must meet the ball squarely. To make this possible, the right wrist should never turn over to the left until the ball has been hit, when it will do so automatically.

If it were possible to stop the club head immediately after impact after a swing in which the right wrist has been kept square to the line of play, the observer would notice that the face of the club would also be square to the line of play and not turned

1 2 3 4 5 6





7 8 9 10 11

over to the left as is always the case when the right wrist has been allowed to turn over at the moment of impact.

The finish, or follow through, is simply the continuation of the momentum of the club head until it naturally comes to rest. The body continues to turn until it faces the line of flight. What little weight is on the right foot should be carried on the toes with the heel well raised. Then, when the club head has gone on through, the hands will take care of themselves.

Addressing the ball

A simple but important preliminary in every shot is addressing the ball, that is, taking a position in relation to the ball and the intended line of play. By addressing the ball improperly, a player may often see a well-hit ball finish on the extreme right or left of the fairway. In many instances, he may miss the green completely.

The simplest and surest method of arriving at the correst address is by applying the following steps in sequence:

1. From a position slightly in back of the ball, place the club head on the ground so that the face of the club is directly at right angles to the line of play, keeping the center of the club head directly behind the ball.

2. Place the left foot in its correct relative position to the ball. For woods, keep the ball in line with the left heel. As the length of the club and the required distance decrease, the position of the ball will be slightly back.

3. Now place the right foot in proper relation to the left.

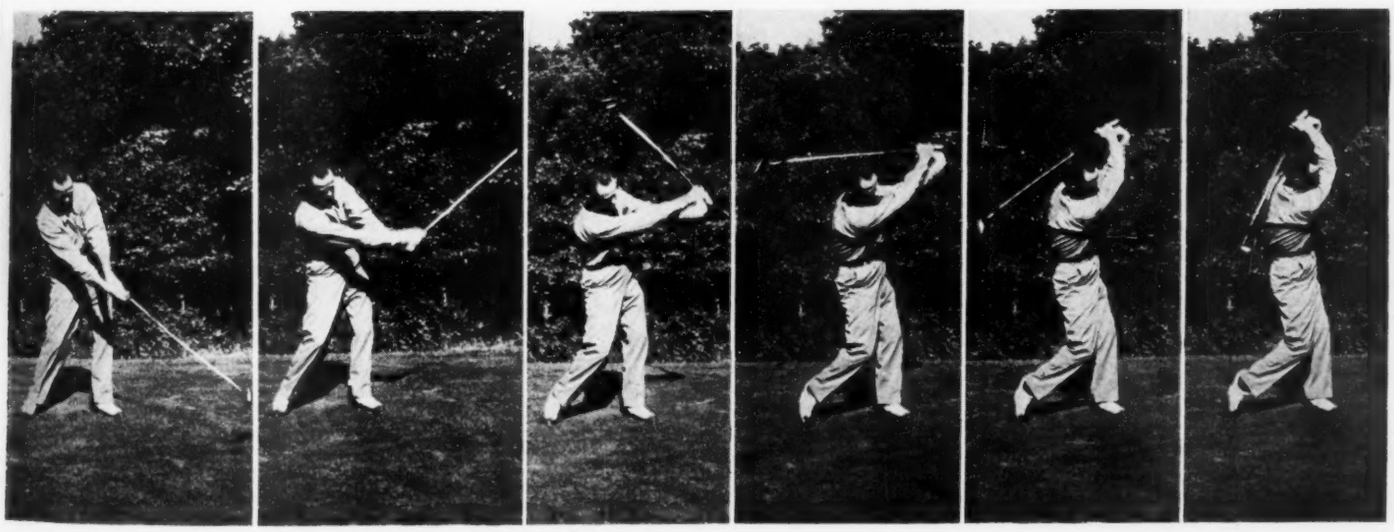
Next month's article will cover the short game, while the final installment in March will be devoted to general teaching hints.

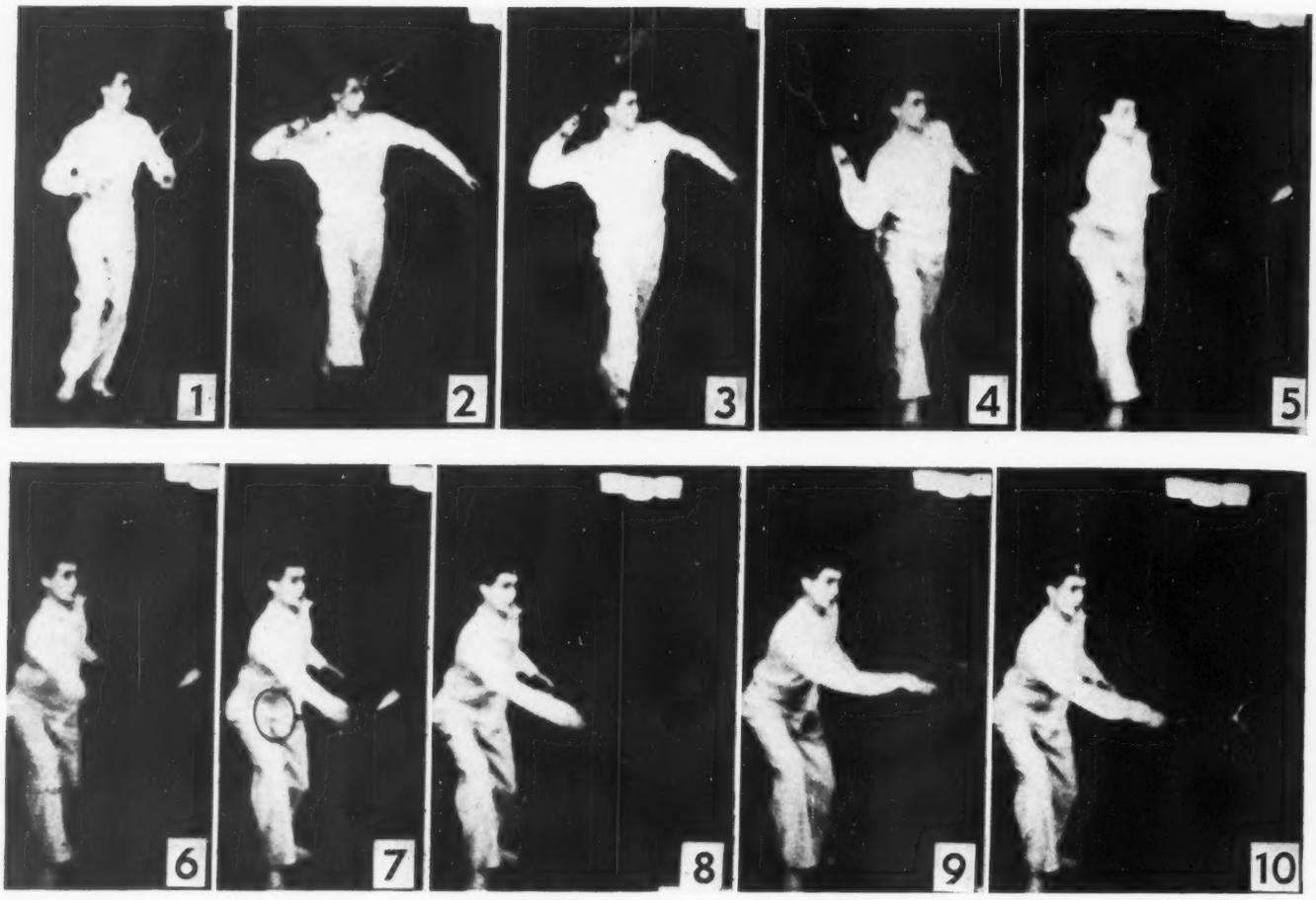
●

Scholastic Coach will welcome suggestions on ways and means of increasing participation in golf, and imparting the fundamentals to high school boys and girls. We would like to know what you are doing along these lines, how you are applying our excellent instructional units, and whether you have any particular problems. Address all inquiries to the Editor, Scholastic Coach, 250 East 43 St., New York, N. Y.

ANALYSIS OF THE DOWNSWING: As both arms come down, the right elbow is kept fairly close to the body so that the club head will descend in practically the same arc as was used in the backswing. When both hands reach a position almost waist high, the wrists uncock and reinforce the speed of the club head as it hits into the ball. In the meantime, the right side of the body is turning to the left, with the shoulder down, so that it is possible at the end of the swing to look over the right shoulder and see the spot that the ball had occupied.

7 8 9 10 11 12





"IN BADMINTON IT'S THE FLICK"

By C. H. Jackson and L. A. Swan

This is the second of a series of badminton articles on the technique of the flick shot, by the famous midwestern coaching-writing team of Carl H. Jackson and Lester A. Swan. The Detroit school men have given the book world two excellent texts on the sport: "Badminton Tips" and "Better Badminton."

MOST players have a natural flair for forehand stroking, and with a little practice attain a fair measure of skill. Too often, however, the comparative ease with which the stroke is picked up encourages the player to follow the least path of resistance in the learning process. In practicing the mechanics of the shot, he never learns how to put the full power of the wrist behind the stroke. As a result, he never realizes the capacious potentialities of the shot.

The same thing holds true of the overhead stroke. Once he has learned to hit the bird downward at a sharp angle, with a fair amount of speed, he is apt to let it go at that. At this stage of the game, a little diligent practice with the wrist action motif will improve the effectiveness of his shots in a surprisingly short time.

The subject in the accompanying pictures possesses an unusually strong forehand, in which he makes the most of an excellent wrist-action. The series traces the wrist positions through the more significant stages of the stroke, starting with the cocking of the racket in the second and third pictures. On the backswing, the racket does not come back very far; but it doesn't have to when the full power of the wrist is put behind the flick.

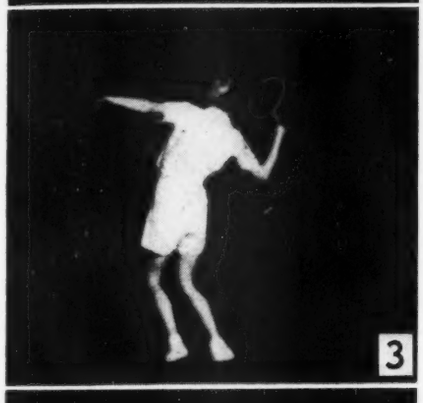
Contrary to fundamental teachings, the *right* foot is forward. There are times, of course, when a player hasn't time to make the shot any other way. But the stance is not *verboden* for the advanced player whose wrist is sufficiently developed to stroke effectively without a long backswing. The right-foot-forward position enables him to turn more quickly to his left to protect his more vulnerable backhand.

The all-important preliminary to the snap and flick—the wrist-lead—is shown in the fourth, fifth and sixth pictures. In the seventh picture, the snap of the wrist can be observed. The withdrawal of the wrist, which follows immediately, is evident in the eighth and ninth pictures. Note that the bird is stroked at full reach, where a more powerful whip may be imparted to the racket head. It is important to remember, too, that the bird should be hit near the tip of the racket, where the maximum amount of speed is centered, just as in case of a snapped whip.

Overhead stroke

In the overhead, the wind-up, as shown in the pictures on page 23, is recommended. This is the same wind-up that is used in the tennis smash and serve. It serves two important functions in the badminton overhead: (1) it accelerates the speed of the racket and (2) it provides an opening for the deceptive use of the delay. With this wind-up, it is relatively easy to fake a smash and check the racket an instant before contact, dropping the bird close to the net. Faking direction is also easier and more deceptive.

The wind-up may be observed in the first four pictures of the action series. The head of the racket swings over the head and to the left side,



circling back of the shoulders to the right side again. In circling the racket back of the shoulders, the head is allowed to drop back perpendicularly. The wrist is kept flexible and the racket is not gripped tightly. In the up-swing (fourth to sixth pictures) the racket head remains below the wrist until the wrist is snapped (seventh picture). The flick or withdrawal of the wrist occurs in the eighth and ninth pictures. Note the position of the racket and wrist at the completion of the stroke. The follow-through is limited where a pronounced wrist flick is used and is relatively unimportant compared to the follow-through in tennis.

It is especially important here to stroke at full reach. For a smash, the stance should be well back of the bird so that it can be hit a little out in front. If the player hasn't time to get back of the bird and must stroke directly overhead, he will be forced to clear or drop rather than smash. A common error is to cut the bird instead of hitting it with the flat face of the racket, which requires a slight turning of the wrist before contact.

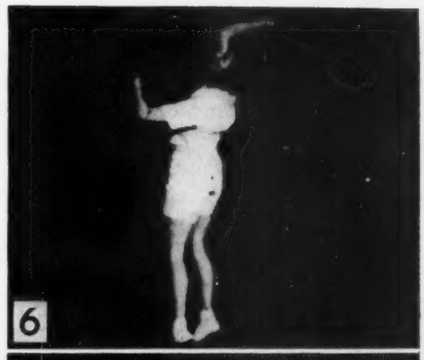
To maintain balance and to make full use of the body and shoulders, the left foot should be forward. In fact, it is impossible to smash severely otherwise. The contrariwise movement of the left arm throughout the stroke is interesting to note and has much to do with maintaining proper body balance and relaxation.

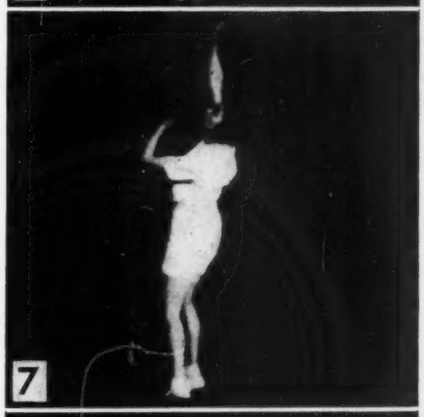
The high backhand

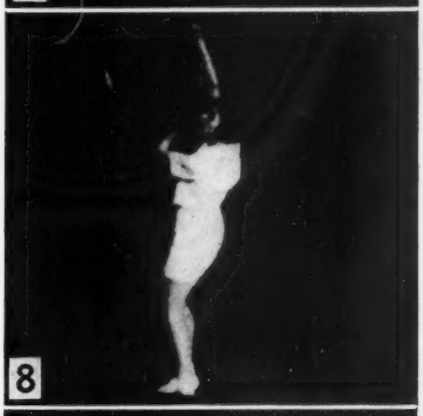
The high backhand is an interesting stroke but is perhaps the most difficult of all to learn. American and Canadian players favor the 'round-the-head for high flights to the backhand. (This is a modification of the overhead in which the body is bent back and to the side, with the racket circling around the head and contacting the bird over the left shoulder.) English players, however, favor the high backhand. A well developed, powerful flick is absolutely essential in the execution of a strong high backhand. Not least of the difficulty lies in the fact that the back is turned toward the net. It is evident from the strip on page 26 that this facing facilitates the full back swing (or more precisely, forward swing) that is necessary to stroke effectively from this position.

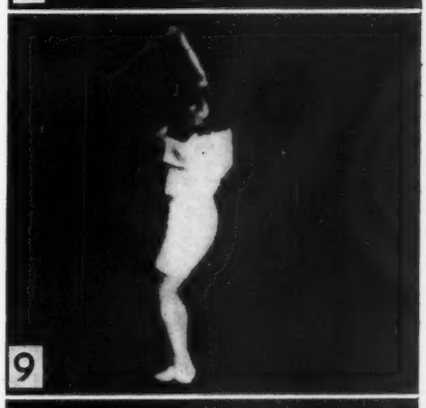
In the second picture the player is beginning to pivot to the left. In the next picture the player is turned halfway around as the racket comes around in front of the body. At this point the racket is pointed down-

(Concluded on page 26)







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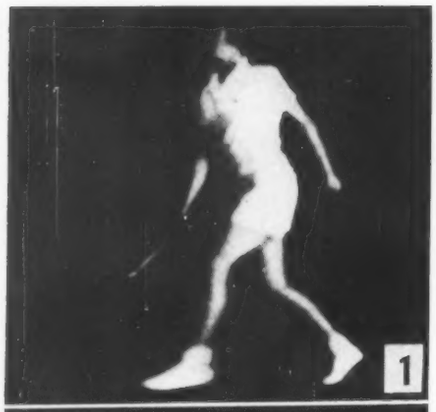
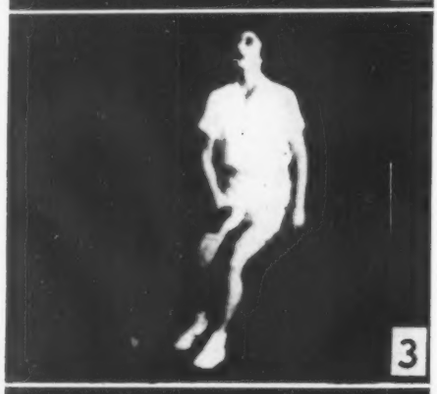




It's the Flick

(Continued from page 23)

wards and the angle of the wrist is very pronounced (fourth and fifth pictures). The backswing is completed in the sixth picture. The wrist-lead may be seen in the next picture and the wrist-snap in the eighth picture. Evidence of the withdrawal of the wrist may be seen in the last picture, where the angle of the racket and wrist give a clear indication of the terrific wrist power that went into this stroke. Here again there is little follow-through.

The weight and the balance of the racket has a tremendous affect on stroking. Most rackets *look* alike and to the unwary novice they all "feel" alike. But there is a great deal of variation, despite the apparently narrow four-to-five ounce racket limitations. Even a quarter of an ounce will make quite a difference. The balance of individual rackets is perhaps even more varied than their weights, again within narrow but significant limits.

Selecting a racket

Of course, no single rule of selection, applicable to everyone, can be laid down. The strength of one's arm, or more especially his wrist, carries the final answer. In general, a racket around four and a half ounces (most certainly under five), with a balancing point of eleven and a half to eleven and three-quarters inches from the end of the handle, is the most satisfactory. A few practice swings with various rackets, employing the wrist fully, will help in the selection.

With a "heavy headed" racket, the player may smash more severely, provided he can handle it properly. He will need a strong wrist and a well developed wrist action to handle the heavier head as effectively as the lighter one. For girls a light headed racket is recommended. The wrist is much more important than sheer physical strength.

While there is not so much variation in the size of the racket handle, it is possible to get a racket with a smaller than average handle. The smaller handle is recommended for players whose fingers are too short to grip securely the general run of rackets.

In general, some type of leather or fabric is desirable as a covering. Leather, perforated with small holes, is a common and fairly satisfactory covering. A racket press and a rubberized, waterproof cover should be purchased along with the racket.

"Oh Captain, My Captain"

By William R. Wood

THE captain is the coach's contact man. His relationship with the team is necessarily more of a confidential nature than is the coach's. Although the coach may be very close to his boys, he can never become one of them. He may guess what they are doing and thinking, but he really never knows. The captain does; he must lead action and thought into wholesome, enthusiastic channels. As a go-between he conveys to the coach the point of view of his teammates; to the boys, the coach's slant on things.

The job has two divisions—general leadership and game leadership. His general duties follow: He should

1. Study the rule book and know it thoroughly.
2. Report first at every meeting and practice session.
3. Always be the first to jump into action when the coach gives a command or a suggestion.
4. Never allow any teammate to loaf or carry on extensive conversations.
5. Be the first assistant to the coach. As such he should encourage all members on the squad, unearth any worries that may be affecting their playing and should assist them in these difficulties. If the problem is one that he cannot handle, he should report it to the coach at once.
6. Set a good example for the team by being the hardest worker and observing good training habits.
7. Keep his mind entirely on the play both in practice sessions and games.
8. Maintain a courteous attitude towards the officials. No other player has the right to communicate with an official. The captain should restrain any player from crabbing about a decision, whether the decision is right or wrong.
9. Show by his personal conduct, in school, on the street, in the locker room as well as on the floor, that he is a hard worker, loyal to his coach and team, and above all a gentleman and a sportsman.

Before every game the captain should go over the game plans with the coach, volunteer any information he may have about the opponents and offer worthwhile suggestions. When the team is ready to go on the floor, the captain obtains the starting line-up from the coach and relays it to the scorekeepers. He should make sure that the name, number and positions are correctly entered into the book.

Once the referee's whistle puts the ball into the play, the captain's authority becomes absolute. Again he leads and encourages, rather than drives, but no team member is permitted to dispute his judgment at this time. The captain has a number of specific duties on the playing floor. He should:

1. Keep a check on the condition of the players and immediately report any injuries or difficulties to the coach.
2. At every time-out, see whether the players need anything from the bench; if so, he should ask an official to accompany him and go after it. He should return towels, or whatever else was wanted, to the bench before the time-out is up. As he comes to the bench he should ask the official to check the correct score and the amount of playing time left in the period.
3. Check every player entering the game—both his own players and the opponent's. If there are any changes in positions, he must know about them and get all the defensive assignments straightened out before allowing the officials to put the ball into play again.
4. Give a word of encouragement to every teammate leaving the game.
5. Make sure that his men are lined up properly on all free throws.
6. Capitalize on the time-out periods to analyze his own team's or his opponents' weaknesses and plan his next two plays.

After every game the captain should congratulate the opposing captain, even if he has to hunt him out in the visiting dressing room. He should also thank the officials who worked the game. Win or lose, the captain should prove himself a real sportsman.

SEATING FACILITIES FOR THE GYMNASIUM

By Donald E. Vance

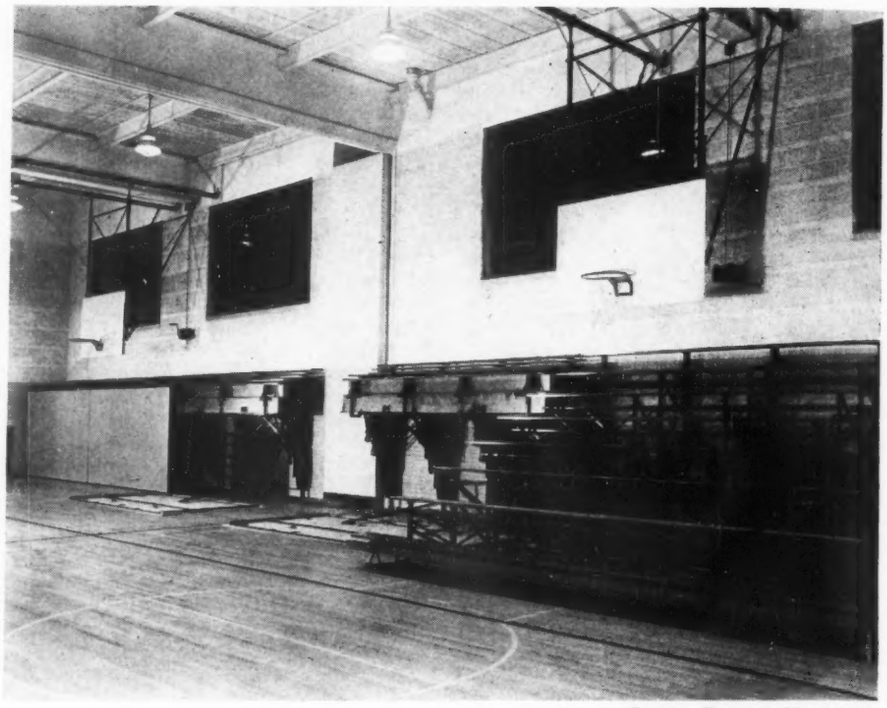
Folding bleachers occupy less space and have a greater seating capacity than built-in seats

THE primary purpose of the gymnasium in the school building is to provide a recreation area for the student body. The gym should be spacious enough to accommodate the largest group that will use it, and it should be completely equipped for basketball. Since an extra court is necessary these days for practice games and intramurals, there should be provisions for at least two courts.

Often, too little consideration is given to seating facilities; yet the bleachers are a part of the building which can pay for themselves through games and other activities sponsored by the student body. In many high schools, the gymnasium also serves as a social center for the community. On the same floor the school team faces outside opponents, various community bodies hold such functions as dances, teas, rallies, etc.

Since the gym has interesting possibilities as a source of revenue, one of the first considerations in planning the layout should be ways and means of obtaining maximum capacity. The entrances and exits should not take up room that could be utilized for seating facilities. They should be located either at the ends of the gym or at the four corners. Where they are located along the sides, they break in upon the choice sideline seats. Since the seats behind the backstops do not provide such good visibility, it seems more logical to utilize this space for the entrances and exits.

The seating facilities can be divided into three general classes: (1) the built-in seats, (2) the folding type bleachers, permanently attached to the floor and the wall, and (3) the portable or removable type bleachers.



Courtesy Universal Bleacher Co.

FOLDING BLEACHERS at Kane, Pa., High School greatly increase the amount of usable floor space. When the unit is nested, the gymnasium may be divided into two practice courts for basketball by swinging down the backboards from the ceiling.

Built-in seats

The built-in type seats, as far as seating capacity and cost are concerned, must be considered a luxury type of seating. They should be considered only where cost is no object and the gym is of an unusual size.

Many schools install built-in seats in order to utilize the space underneath the stands for locker and shower rooms. The idea is excellent but it has its drawbacks. So much floor space is needed that it is usually necessary to sacrifice the cross-courts and other areas that could be used for physical education purposes.

Another drawback to built-in seats is their expensiveness. The school must consider not only the cost of construction but also the value of the space occupied by the seats. By averaging together the cost figures of a number of gymnasium projects, building experts estimated that a square foot of gym floor is worth approximately five dollars. Therefore, if two banks of fixed seats occupy 2000 square feet, they are taking up approximately $10,000 worth of space. To this figure, we must add the cost of construction. The built-in seats may be constructed of wood or of reinforced concrete with wooden seats. If the stadium or opera chair type of seat is desired, the unit will naturally be a much more expensive proposition.

The folding type bleachers, which are permanently fastened to the floor and gymnasium wall, provide an answer to some of the problems aready discussed. They cost about as much as the general run of built-in seats, but far less than the built-in unit which comes with stadium or opera chair seats.

When the gym is to be used for physical education or for basketball practice, the folding seats may be folded over. In the nested position, they occupy only a small fraction of the space that is normally required by the fixed seats, with the result that they greatly increase the amount of usable floor space.

A bleacher six rows high, which occupies a little more than ten feet of space when opened, will occupy only two and a half feet when folded. When more rows are used, the space occupied in the closed position is proportionally smaller; and, therefore, the space saved is much greater. The total accumulation of extra playing area may be converted into two, or possibly three, extra cross-courts for basketball.

Another very valuable feature of the folding bleacher is the fact that it provides for a greater seating capacity than the built-in type. Experts have estimated that 22 in. of seating space front to back per row is comfortable for the mixed crowds attending basketball games. For built-in seats, however, most architects, allow 28 in. to 30 in. of space per row. They must also deduct from the seating capacity the space taken up by aisles, especially where sta-

dium or opera type seats are used.

The third, and last, type of seating unit, the portable or removable type bleacher, furnishes the same advantages as the folding type. The latter can be nested in much less time, but the cost of the portable unit is a great deal less.

If the school decides on portable bleachers, it is necessary to provide for storage facilities close to the gym. It is often convenient to use rubber-tired trucks as a mode of transportation. The bleachers may be stacked compactly on the truck and left there after being pushed into the storage room. The cost of these trucks is a minor item, but they render valuable service in saving time and wear and tear on the gym floor.

Installation problems

The installation of bleachers is often complicated by natural obstructions. Radiators, for example, often interfere with a good job of installation. Whenever it is necessary to place radiators along the walls, it is advisable to build recesses for them. Otherwise they will project into the gym and occupy valuable seating space. It then becomes necessary to set the folding or portable bleachers out in front of the radiators. In this contingency, an overhead system will solve the heating problem.

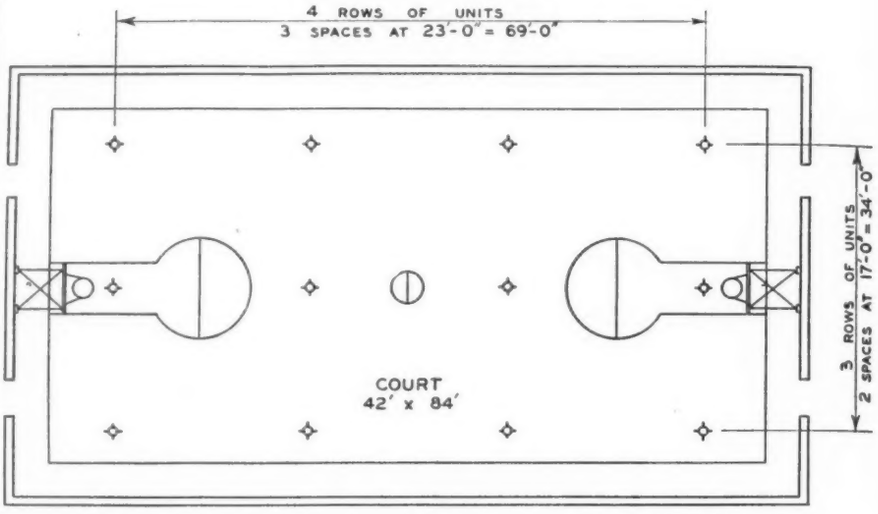
Other gyms have natural obstructions in the form of large columns or pilasters which extend beyond the face of the wall. In this situation it may also be necessary to set the bleachers or folding type stands flush with the obstruction.

An even more common obstruction than radiators and pilasters, is the timekeeper's table along the sideline. Frequently a school will cut off a valuable section of the bleachers along the sides of the playing floor to make room for a desk for officials and timekeepers. A good bleacher will save most of this wasted seating space. Both the folding and the portable type bleachers have units which contain the necessary table space. This feature increases the seating capacity of the gym and at the same time eliminates the desk hazard on the sidelines.

Where it is necessary, in the interest of economy, to use the same area for both physical education and auditorium purposes, the stage should be located at one end of the room, and the exits and entrances at the corners of the platform and at the other end of the room. With this type of layout, the gym retains its normal seating capacity along the sides.

Planning a Lighting System

(Continued from page 10)

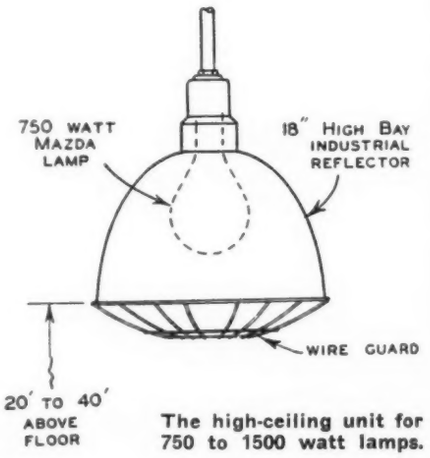


This type of layout is recommended for gymnasiums with high ceilings.

alterations in years to come.

When designing the new system, with your past experience in mind, two requirements should be met. First, provide sufficient extra capacity in the wiring to take any reasonable increase in future load. Second, select lighting equipment which will accommodate larger size lamps. This means that the number and location of the new units must be carefully determined so that the lowest wattage lamp the unit will take can be used rather than the middle wattage lamp. For instance, lighting equipment suitable for our typical gymnasium is manufactured in two sizes—a unit which will take either a 300 or a 500 watt lamp and a unit which will take a 750, 1000 or 1500 watt lamp. In the interest of future additions, the design should be such as to permit the use of a 300 watt lamp in the former and a 750 watt lamp in the latter unit. Thus, the illumination can be doubled merely by the substitution of higher wattage lamps.

The number and position of the lighting equipment in our typical floor plan is determined entirely by the available mounting height. Obviously, the higher the mounting the better, to avoid interference with the basketball and to minimize glare. In order to obtain a uniform distribution of light a spacing of units approximately equal to the mounting height is desirable. In gymnasiums used only for exercise, wrestling, boxing, volleyball, etc., where a low ceiling (12 to 20 feet) is encountered, more units of lower wattage each will be required than if the clear distance to ceiling or trusses is high (20 feet or more.)



The high-ceiling unit for 750 to 1500 watt lamps.

In each of the two ceiling height classifications, 12 to 20 feet and 20 to 40 feet, a different type of reflector will be required to utilize the generated light most effectively.

Two floor plans accompany the article, one with a low ceiling and the other with a high ceiling. Each has the recommended location, type and wattage of lamp required to produce 15 foot-candles* of uniformly distributed illumination.

Since this plan is intended to represent a typical floor, revisions will, no doubt, be required to adapt it to any specific gymnasium. The type of ceiling construction, location of beams or other obstructions may make it advisable to alter the fixture positions slightly. In the low-ceiling plan, particular care must be

*This value of illumination for gymnasiums is in accordance with the 1938 Code of the American Recommended Practice of School Lighting prepared under the joint sponsorship of the Illuminating Engineering Society and the American Institute of Architects, and adopted as an American Standard under the procedure of the American Standards Association.

exercised with the lighting units over the baskets, to avoid the possibility of glare in the eyes of the shooters.

Lighting equipment should be selected from a safety consideration as well as from the viewpoint of performance. The amount of glass should be minimized; an all-metal unit being preferred to one made of glass. Wire guards should be provided over all units to prevent lamp breakage.

Inside frosted lamps are preferred to clear lamps in the interest of glare reduction.

Lighting equipment should be cleaned regularly on a prearranged schedule. Dust and dirt accumulating on the reflecting surfaces of the fixture can be responsible for a 30 percent or greater reduction in generated light. Special hanger equipment is available to permit the lowering of fixtures, which are difficult to reach by ladder.

This covers the fundamental requisites of a good lighting installation. The details must be worked out by close cooperation between the school and the contractor.

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Sound Equipment

(Continued from page 13)

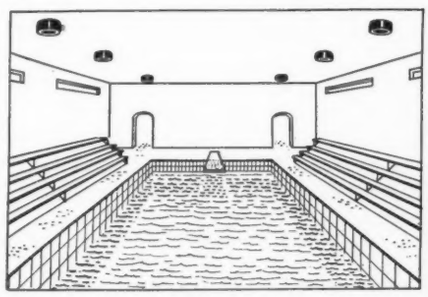
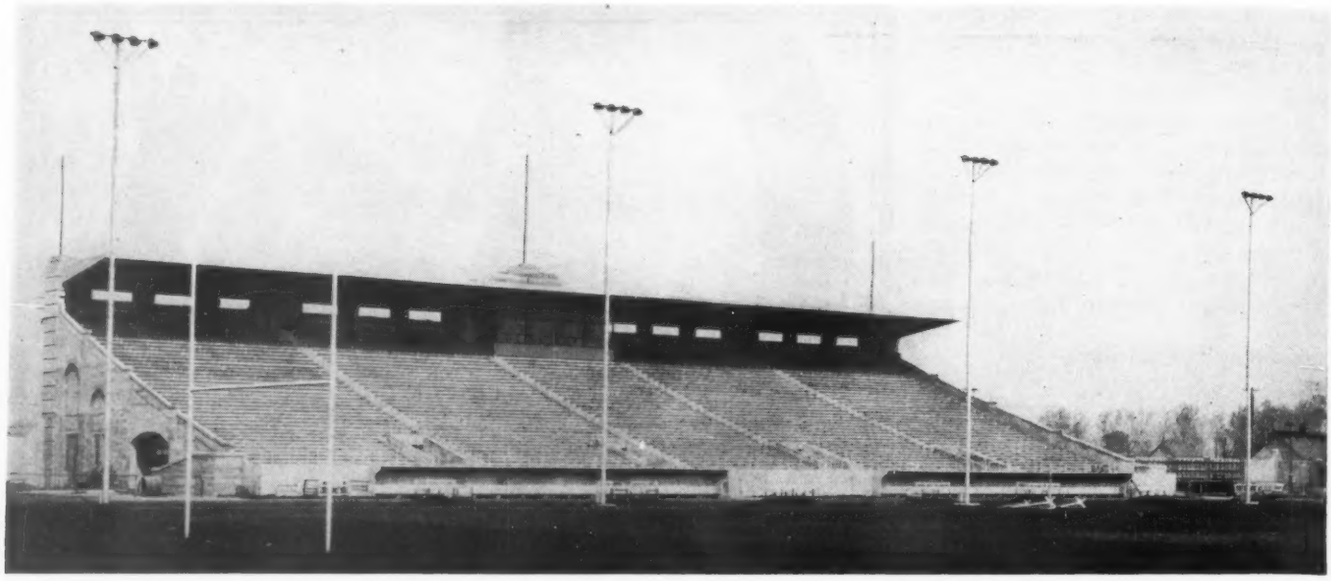


Figure 3

loudspeakers should be used in this layout. Figure 3 shows a suitable arrangement for the swimming pool. Here metal housed automobile type loudspeakers give the best performance. The speakers are placed on the pool ceiling and directed downward toward the surface of the pool. This enables the swimmers to hear instructions more readily, and still provides adequate sound coverage for spectators.

In all situations where the purchase of sound equipment is being considered, it is advisable to call in the sound engineer of some nationally-known manufacturer of the desired equipment. His services are available without cost or other obligation and may save many dollars in installation and upkeep costs.



A MODERN HIGH SCHOOL STADIUM

By Harold Parker*

SANDUSKY, Ohio, has no ivy-festooned college or university to lend a decorative note to the landscape, but it does have a high school stadium which is comparable in size and construction to most other secondary school stadia constructed during the past few years. In general, the stand consists of 40 rows of seats which have a length of 209 feet and a seating capacity of about 5,500. The rear rows are protected by a reinforced concrete cantilevered roof the full length of the structure; and, more than many a college stadium can boast, Strobel Field Stadium has a glassed-in press box and radio booths at the center of the structure under the roof.

To provide maximum vision, the seats are set higher toward the rear so as to give a dished or bowl effect to the cross-section. Beneath the stadium deck are housed: (1) A concession stand. (2) Locker rooms, shower rooms, toilets and training rooms for both the home team and the visitors. (3) Public toilet facilities for men and women. (4) Caretaker's quarters consisting of a living room, dining room, kitchen, bath, 2 bedrooms, and laundry, automatically gas heated for all-year use.

The locker room for the home team has 150 lockers. Adjoining this room is the coach's office and officials' room; the equipment room; the training room, which is provided with heat lamps, two training tables and three baths for warm water treatment; the shower room, which has nine shower heads, a tile floor and tile wainscoting six feet high; and finally the toilet room, which is tiled in similar fashion to the shower room.

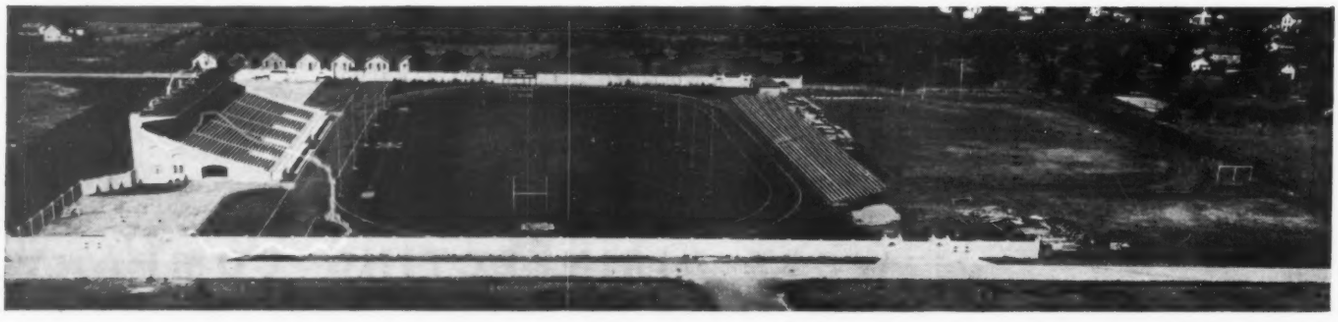
The visitors' quarters are a duplicate of those of the home team, except for size. The locker room accommodates only 60 lockers and the remaining rooms are proportionately smaller. Heating of these quarters is done entirely by gas fired unit heaters of warm air located near the ceiling.

The dugouts in front of the stadium were designed expressly for football, as baseball is not on the sports calendar of the local high school. The idea was to provide a covered retreat for the benched players and coach, and also to eliminate the unsightliness of littered sidelines. The dugout itself consists of a cantilever roof of concrete and a stationary players' bench. While the floor is below the natural grade, it is drained to carry off the water.

The press box is entirely enclosed in plate glass and has accommodations for 14 reporters, each of whom is provided with an individual desk for either typewriter or shorthand work. Every desk is individually lighted for night football coverage.

To the right of the press box is the broadcasting booth, which is both sound-proof and accoustically treated for sound reverberation. Both the press and broadcasting rooms are equipped with electric heaters. The accent on up-to-the-minute furnishings also takes in the stadium's scoreboard and clock, which are

*The author, a Sandusky, Ohio, architect, designed the Strobel Field Stadium, while R. C. Reese handled the structural design and the WPA contributed the labor. Some of the material in this article appeared originally in a technical exposition of the construction by Mr. Reese in the May, 1938, issue of *Concrete*.



electrically operated, and an intercommunicating field phone connecting the press box, dugout, scoreboard and timekeeper.

The public address system consists of six horns with microphone connections in the broadcasting booth and in front of the stadium, where the speaker is in view of the audience. The system is used for announcements, to broadcast music and to amplify radio programs.

The field itself is made up of a gridiron and a quarter-mile track. The track is curbed on either side with cement, and is 24 feet wide directly in front of the main stand and 18 feet on the curves and far side. It is tile drained and has an 18-inch bed of crushed stone with a top dressing of finely screened cinders and black loam.

As in practically all our modern stadia, the gridiron is completely equipped with a floodlighting system. The lighting plant consists of five 50-foot steel poles on each side of the field, with four floodlights to a pole. The present illumination provides between eight and ten foot candles of light on the playing field, but an additional 25 percent illumination can be added whenever desired.

The entire playing field is enclosed with a reinforced concrete wall, nine-feet high, supported on heavy concrete piers. The practice field next to the stadium is enclosed with a laced wire fencing, seven-feet high with three strands of barbed wire strung across the top. The entire athletic field, including the practice field, is 540 by 780 feet.

Concrete motif

Because Strobel Field is isolated from other school buildings, it had to be considered as a separate unit, housing all the usual facilities that go with a stadium and, in addition, a transformer room to take care of floodlighting equipment.

The structure was arranged on the site so that the high side of the stands fronted on the principal avenue of approach. This necessitated architectural treatment that would be worthy of its prominence. Since concrete was the principal material of construction, the architecture depended upon the execution of formed motifs in concrete. Pleasing architectural effects were obtained at little cost through proper grouping of masses in keeping with the character of the structure.

Reinforced concrete was chosen over steel for the following reasons: better appearance, lower maintenance cost, economical first cost and the fact that the work could be done on the site, thereby providing more man-hours of local unskilled labor.

Individual and Team Defense

(Continued from page 17)

with the dribbler, using her inside hand to either hook the ball or stab at it in the hope of retrieving it later. If the dribbler and she are about to grasp the ball simultaneously, the guard should wrench it from her opponent's hand with a quick jerk or twist. She should then pivot and protect the ball by presenting her back to the opponent. If the guard finds it impossible to steal the bounce, she should at least crowd the forward toward the sideline where she will be in a poor position to shoot or pass.

On a shot, a sudden shout or stamp of the foot may rattle an inexperienced player. At any rate, the guard should "flag" the shooter by waving an arm at her. The constant waving of extended arms disconcerts the shooter and makes it difficult for her to concentrate on the shot. If the guard is close enough, she may actually deflect the shot with her extended arm.

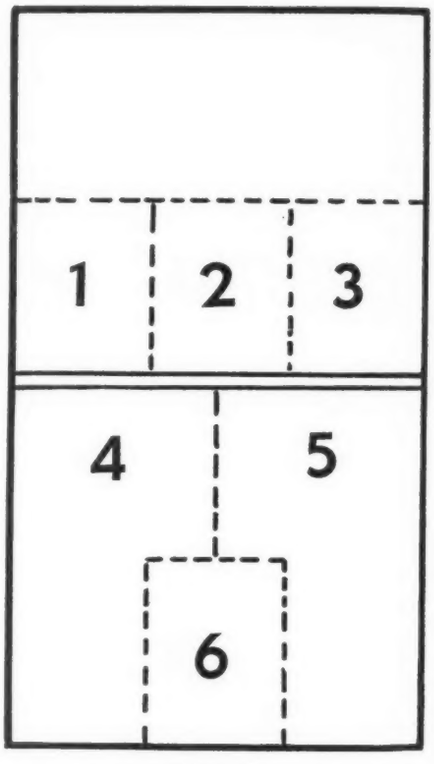
As the ball leaves the forward's hands, the guard should immediately pivot and go in for the rebound. Many players have a habit of turning their heads and watching the flight of the ball, when their first duty should be to block the lane leading directly to the basket. The guard should turn squarely into the forward's path and run in front of her, keeping her body between the shooter and the basket. To follow up the shot, the forward is thus forced to run around the guard. However, in turning and running in front of the shooter, the guard should be sure to avoid making any contact.

Two-on-one situation

Sometimes a quick breaking offense will leave a defense player stranded with two attackers. When this situation occurs, the guard must do the best she can to slow up the attack until a teammate comes to her rescue. If the player with the ball is within scoring distance, the guard must threaten her enough to bother her shooting but still keep in a position to prevent a pass and an easy set-up shot by the other player. The guard should never play one girl, but should work on both: worrying the passer and covering the other.

There are many types of team defenses, all of which fall into two general classifications: the man-to-man and the zone. In the man-to-man defense, each player selects a particular opponent and covers her throughout the game. It is probably the easiest system to coach and play; and as such it is particularly valuable for intramural games, where the players have little opportunity to practice as a unit. The responsibility of each player is clearly defined, which is not always the case in zone defense.

The chief objections to this type of play are: (1) It is more tiring on the players. They must burn up a lot of energy following the opponents in less dangerous areas of the court. (2) It exposes the players to screens and natural blocks. When two members of the offense cross, the defensive players have a tendency to come together and bump each other. The only way to avoid this bump is by sliding or switching (see **Diag. 1**), both of which require considerable practice to perfect.



Diag. 2

A zone defense, on the other hand, is immune to screen plays and blocks. Each girl plays position on the floor and the ball rather than an assigned opponent. As soon as their team loses possession, the girls rush to the defensive positions indicated in **Diag. 2.** Each player is responsible for her particular zone and anybody in it. When the ball is on one

side of the court, the girl in the adjoining zone moves over to the edge of the danger zone to render aid if needed. No. 6 covers the area around the free-throw lane, and is ready to reenforce any possible weak point that may show up.

This type of defensive alignment is certainly less fatiguing and probably more effective (with good coaching) than the man-to-man type. However, every defense has its weakness. The weakness of the zone is its inability at times to cover adequately two offensive players who very suddenly thrust themselves into a certain zone. Unless the zone players are old hands at it, they will be unable to cope with these overloading tactics. Only long, hard practice will instill confidence in the zone and teach the players just how to cope with all unforeseen situations.

Following are a few additional hints on defense:

1. On foul shots, be sure to assign a guard to the shooter. Unless someone steps in front of her, she may drive in and recover the rebound.

2. Avoid cross-court taps or passes in front of the basket; an interception will likely mean an easy score.

3. Be aggressive. Have confidence in yourself. Dominate your opponent.

4. When possession is lost, look for a "sleeper" under your defensive basket.

5. If the forward gets ahead of you on a long break for the basket, turn your back to the ball and take the shortest possible path to the basket.

6. Practice shifting in every direction while in a defense stance.

7. Don't crab at the officials or teammates, or criticize the coach if she takes you out of the game.

8. Above all, don't get excited if the forward scores a few baskets.

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Lighting Survey

(Continued from page 16)

Several other interesting reports on output, follow:

1. Seven schools reported 60KW outputs, indicating a probable ten-pole layout with four units per pole and 1500-watt lamps.

2. Seven other schools reported KW outputs ranging between 70 and 75, obtained by using eight poles with six units per pole or ten poles with five units on each.

3. Three fields are lighted with systems totalling 90KW, which probably infers a ten-pole layout with six projectors on each.

These figures are based on lamps which are being burned at normal voltage. In most cases they are burned at 10 percent over-voltage, giving an increase of 16 percent in KW output and 35 percent in brightness.

The installation costs of these systems ranged from a low of $240 for one of the fields with a 15KW output to $12,000 for the one reporting 144KW. The average cost came to $3,200.

In computing the average operating cost per game, the 15KW outfit and the 144KW system again represented the extremes. The figures ranged from a low of $2 for the former to a high of $30 for the latter. The average operating cost per game was $8.45, a drop of $.75 from 1938.

All the schools reported a great jump in gate receipts through night games. The range was from 62 percent to 570 percent with an average of 238 percent, a somewhat higher figure than the 212 percent reported by the 530 schools in last year's survey.

St. John's Free-Style Offense

(Continued from page 7)

he will always have the dribble left in case of trouble.

We like to work the ball in as close as possible before risking a shot, but we have no objections against long-range shooting, provided the player is reasonably set. Even an occasional one-hand heave is not considered a heinous crime, as long as it is thrown from a spot close to the basket. Some of the shots we don't even blink at today would have made some of the old masters shudder.

There was a time when practically all forms of one-hand shooting was taboo; and a one-hand heave on the run was the quickest route to the bench. Today it is the so-called "unorthodox" shooter who always seems to give you the most trouble. I dare say our own Bill Lloyd, an unorthodox shooter if ever there was one, drove many a St. John's opponent to the aspirin box last year.

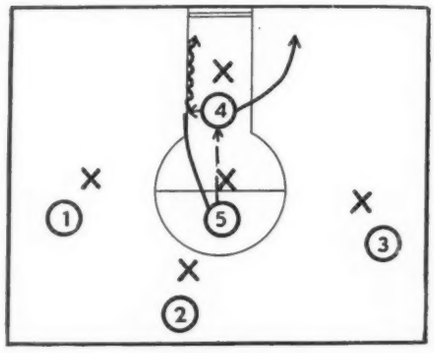
Lloyd used to drop into the pivot, cradle the ball on his wrist, step out and shoot with a stiff-arm motion. He was absolute death with this hook-like shot, so much so that he still holds all individual scoring honors for Madison Square Garden. But what made the shot really unique was the fact he made it without looking at the basket!

Man-to-man preferred

As far as defense is concerned, St. John's adheres to a man-to-man. We emphasize switching but try to keep it within bounds. For too much switching is almost as bad as none at all. When your team becomes too-switch conscious, you will often find one boy pulling a switch all by himself, with the result that two men are on one and one opponent is loose.

We use a two-man drill in our work on this fundamental. Two players are put on offense without the ball, and two other men are assigned to cover them. The offensive men work swiftly down the court, setting up as many situations as they can. I keep on top of the boys, yelling "switch" whenever the set-up calls for one. If the boys over-switch, I immediately stop the play. We go over the particular situation and I show them how they could have solved the problem without a switch.

There are numerous little faults to watch for on defense. Many players come up to college ball without the faintest idea of the fundamentals of good defense. The increasing popularity of the zone defense in our high schools is undoubtedly a contributing factor. In learning the mechanics of zone defense, the boys never thoroughly absorb the basic fundamentals of defense. They will leave their feet, turn their head, fall for simple feints, etc. In a zone, these habits may not get them into trouble, since they are playing the ball and position on the floor. But in a man-to-man, the consequences are disastrous.



Diag. 4

This play is built around a jump-ball situation in the free-throw circle. When we are assured of the tap, 4 takes a position just inside the dotted line. The other men scatter to draw their opponents as far away from the jump as they can. 5 taps the ball to 4, comes down as quickly as possible and breaks away for a pass and dribble to the basket. As in the other plays, the passer pivots away from the cutter and goes for the basket. 5 enjoys a definite advantage over his opponent on this play. He knows exactly what he is going to do when he comes down; his opponent, as a rule, does not.

As a rule, we try to take advantage of the transition from defense to offense by striking quickly with a fast break. However, we have no set pattern in attacking with this weapon. The players under the backboard fight for the rebound, while the men in the backcourt stay with their opponents. Once the recovery is effected, however, they break for the basket post haste. The ball is worked down with a modicum of ball-handling, the pass always going to the free man up ahead.

No matter what type of offensive gesture is being employed at the moment, the first rule to observe is to look up and see if anyone is open under the basket. The same rule holds true on defense. The last man back should always turn around and look for a "sleeper" under his defensive basket.

Electric Timers and Scorers

By Wayne Eckley

Wayne Eckley, of the Pontiac, Ill., Township High School, outlines the various types of electric wall clocks and the functions they serve in timing basketball games.

THE use of the electric wall clock for official timing of basketball games, both in high school and in college, has become quite commonplace throughout the country. In most of the newer gymnasiums an electric timing device is part of the standard gym equipment, along with an electrically controlled scoring apparatus.

The need for an electric device, placed where both the spectators and players could see it at all times, was always acute in the old days, especially during particularly close-fought games. Many an honest timekeeper had to leave the floor under police escort. For when seconds are of vital importance, the rabid fan will not trust his grandmother with the watch. He wants to see it for himself. Largely because necessity is the mother of invention, different types of electric wall clocks began to make their appearance.

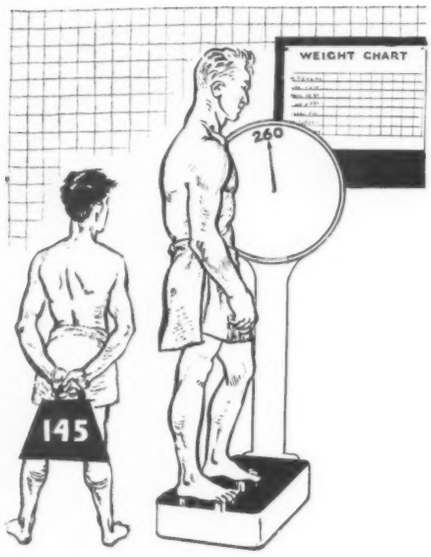
Early types

One of the first types which we used at Pontiac had a clock circle which measured four feet in diameter. This outer circle was used to indicate the minutes of the playing time and an inner circle, which measured about two feet in diameter, indicated seconds. Two separate clock hands moved around the dial, the larger indicating minutes and the smaller hand marking off seconds. After using this type of clock for one season, we decided that the dial did not have to be that large to be visible from all parts of the gym, which has a playing floor 80 by 45 feet. Therefore, without changing the gearing or mechanical construction of the clock other than to make it smaller, its size was cut down so that the outer circle had a diameter of three feet six inches and the inner circle a diameter of twenty inches. This worked satisfactorily.

Various types of electric wall clocks have been designed within the last year or two. One type of clock has two hands of different sizes moving about a single dial. For high school games, since the quarters are of eight minutes duration, the entire circle has been divided into eight parts. The minute

(Concluded on page 47)

Coaches' Corner



If you have something for this column send it to Bill Wood, Evanston Township High School, Evanston, Illinois.

Another decade has come to an end. In the annals of American sport it may well go down as the "Thrifty Thirties," an era in which salaries and athletic budgets were pared to the bone, when schedules were limited and officials meagerly paid. Yet the popularity of American sports as a distinctive feature of a sane and wholesome way of life increased tremendously. In accepting the Heisman Memorial trophy as the year's outstanding football player, Nile Kinnick, the gentleman-scholar from Iowa, put the matter very effectively:

"I thank God I was born to the gridirons of the Midwest and not to the battlefields of Europe. I can confidently say that the boys of this country would rather win this trophy than the Croix de Guerre."

We are still trying to discover the smallest as well as the largest high school football player for the year. Our correspondence to date reveals several candidates. Coach H. H. Lemoin, Otsego, Mich., tells of Robert Wesler who tipped the balance at a mere 265 pounds—then ate an apple and broke the scales. Lemoin also passes along the details of a football game played in halves instead of quarters.

"With a strong wind blowing down field Constantine, Mich., chose to take the wind. The watch stopped, and before it was checked, the game had run for 40 minutes. It was still the first quarter. Later it was agreed to play the last half without a break in time. Both teams scored with the wind."

Coach C. Alfonse of Sparta, Wis., includes a picture with the description of his candidates for the midget and the giant titles. "Seventeen-year-old Gordon Peterson, regular tackle, stands 6 ft. 6 in. high and weighs 260 pounds stripped. He wears size 15 shoes and size 38 pants. Rex Slayton, regular halfback on the same team, weighs 115 pounds and wears size five shoes, but he is plenty fast and tough. Both boys are planning to enroll at Wisconsin next year."

Coach Arthur Hofstetter, White Sulphur Springs, W. Va., also has a candidate for the man-mountain derby—his center and captain, Sherman Perry, a 266-pound, 6 ft. 2½ in. giant, who is an "A" student as well as a conference football star.

Coach Devitt of Tolleston (Gary, Ind.) puts in his vote for "little" Clarence Lanus, 263 pounds, who plays both football and basketball.

However, Coach Leslie Pfeiffer of Burbank Vocational in San Antonio, Tex., has a boy who has 'em all beat. His right tackle, Sam Granato, was only a 245-pound stripling in 1938, but he returned last season at 277 pounds and played a great game. He is looking forward to a "bigger" year next season.

Some of the sidelights about basketball that got in the news during 1939 follow:

The title of the "Tallest Team in the World" was won without protest by West Texas State College. With an average height of 6 feet 6½ in., the starting line-up of Nippert, Stephenson, Shackelford, Johnson, and Kendrick, simply played over the heads of most of their opponents.

Loyola University, Chicago, turned in its second undefeated season in sixteen years of athletic competition. The brilliant work of the all-Americans, Wib Kautz and 6 ft. 9 in. Mike Novak, was the key to the Ramblers' success. The two are now "blazin' the boards" for the Chicago Bruins in the reorganized Professional Basketball League.

The five years' winning streak of John Tarleton Agricultural College, Stephenville, Tex., was brought to a close, but the Plowboys managed to win 9 out of 10 games on an unexpectedly abbreviated schedule.

Probably the best high school record in the country during 1939 was that of Glasgow, Mo. The Yellow Jackets struck pay dirt 44 straight times, but lost out in the semi-finals of the state tournament. During the season, they won five tournament titles.

Our Elsie is in the news again. The picture above is our version of how Miss Crabtree rated a fourth place tie with Eleanor Holm for woman-athlete-of-the-year honors. Alice Marble's good right arm and racket beat out Elsie's dimpled knees and baton, but the drum majorette of the University of Nevada was in there pitching to the end.

Coach Eddie Chambers' Crystal Falls, Mich., team won 18 contests in the Iron Country, winning the Iron County, the Menonimee Range, and the Upper Peninsula championships in one season. Chambers, former Michigan captain, will be remembered as one of the greatest guards ever developed in the Big Ten.

Few high school coaches are as widely known as Everett N. Case of Frankfort, Ind. It takes something special to win the Indiana state title four times, and Coach Case's crack teams of 1925, 1929, 1936, and 1939 have done just that. Sport writers have dubbed Frankfort "Capital of the Kingdom of IHSAA."

The players that Coach Skillern puts on the floor this year to represent Central High School, Tulsa, Okla., will have quite a record to uphold. Their predecessors left a string of 31 consecutive victories including two state championships.

By the way, we wish Mark Almli would tell us why the teams representing Eau Claire, Wis., are called the "Old Abes." (In general: What's the story behind the name of your team? There are certainly some odd nicknames in the sport sheets.)

If any newcomer to the profession would like something to shoot at, he might take a look at the record of Coach Morse of Charleston, S. C. In 16 years of coaching he has connected 11 times for the state championship. Has Ripley heard about this?

To parody Burgess Gillett (?): "I never saw a Hodag, and I never expect to see one," but the Hodags of Rhinelander, Wis., must have been worth seeing last season. They were undefeated in 20 games and annexed the state championship for good measure. Coach Leksell is a native of Ironwood, Mich., and a former football star at Minnesota.

One of the most amazing reversals of form last season was that of Lincoln County High School, Panaca, Nev. After losing 10 of the first 11 games on the schedule, the Lynx uncorked an 11 game winning streak that carried them through to the state title.

The South Dakota title for 1939 was won by the Flandreau Indian High School team under the leadership of Captain Redthunder. That was one championship team composed of all-Americans. If you don't believe us, look it up in the 1939 *Converse Year Book*, to which we are indebted for the information.

According to an Associated Press dispatch from Highmore, S. D., the leading scorer in the Stephan Indians' defeat of Blunt was Two Two, a forward. He scored 22 points. Bluntly, Two Two's 22 was too much for Blunt.

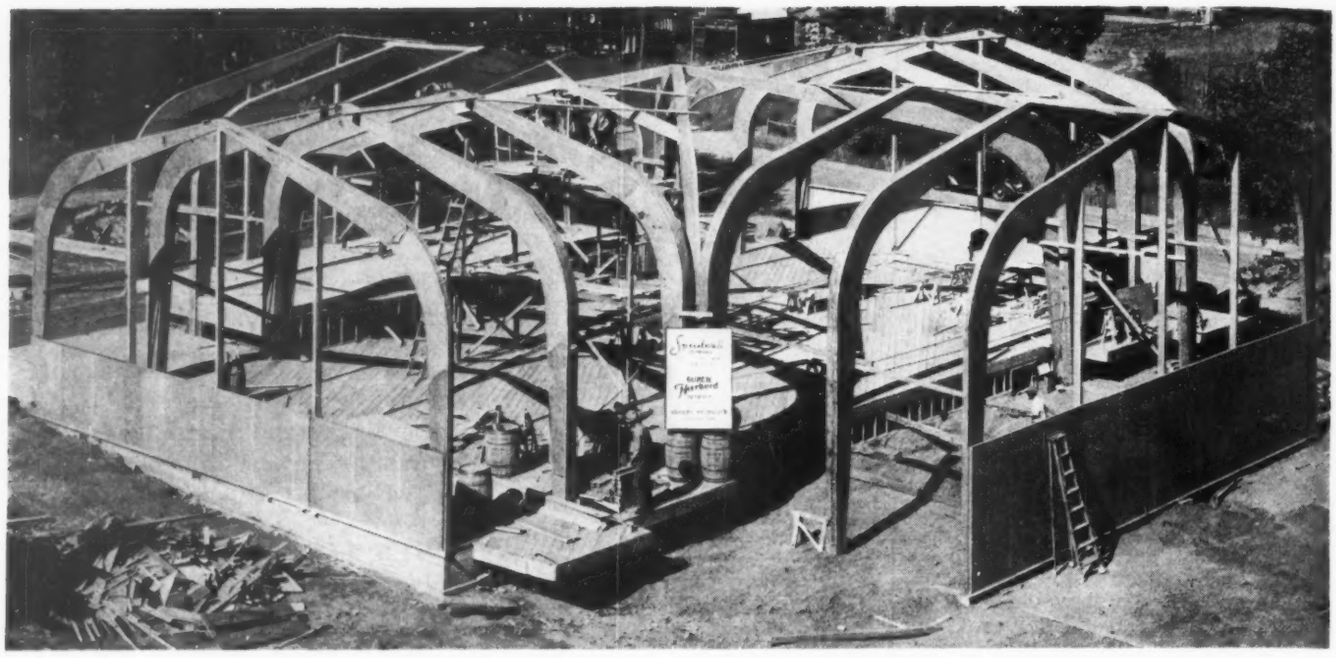
Ghost basketball made its bow at Ripley, O., on Dec. 13 when a game was played in total darkness, the suits and necessary markings being swabbed with a fluorescent paint.

When it comes to service records in coaching, Coach Paul Taliaferro of Bowie, Tex., High School steps up with a plug for Paul Tyson, who has just completed his 27th year as football coach at Waco. Tyson's service has not only been long but successful. His Tigers won the Class A championship of the state in 1922, 1925, 1936, and 1937.

Coach Dell Johnson, Bluff City, Kan., sends us news from the six-man front. "Bluff City High School opened its six-man football season with a 13-6 victory over Wakita, Okla. Alvin Scheel, playing his first game, caught a pass just over the goal line for a touchdown; but as the referee took the ball from him and placed it on the two-yard line for the extra point attempt, Alvin supposed his touchdown was no good. He didn't know he scored until he read his name in the paper the next day. In our closing game of the season we trounced Gore High School of Jefferson, Okla., 101-0. We believe this to be the six-man scoring record for the year."

Oak Park, Ill., extended its unbeaten record to 33 games this season. The last victim was Martins Ferry, Ohio. Eau Claire, Wis., Oak Park's other out-of-state opponent for the year carried home a tie score.

BILL WOOD



ABOVE: Gymnasium at White Salmon, Wash., under construction. A photograph of the completed structure is on the front cover. The building was prefabricated by the Speedwall Co. of Seattle. The laminated trusses are of Douglas fir plywood, the laminations being bound together with Laux glue. The gym is in the shape of a cross, composed of a center cell or square, with four equal size cells forming the wings. The roof and sidewalls are also of plywood with an insulating material between. The gym is unusual in that 85% of the material used in the construction is plywood; a maple floor makes up the remaining 15%.

BELOW: The gymnasium at Darlington, Wisconsin, was a W.P.A. project. Max Hanisch, Sr. designed the building, and the glued laminated arches were fabricated by Unit Structures Inc., at Peshtigo, Wisconsin. The span of the arches is 62 feet. This type of built-up laminated arch construction has a great advantage over conventional steel truss construction in that it allows for lower side walls without sacrificing clearance at the center of the building. A steel truss with its lower cord set on a low side wall would not give sufficient clearance for gymnasium activities played near the walls.

Plywood Gym Construction

PLYWOOD has come of age. Nearly all of us are familiar with Plywood in its familiar sheet form. There is nothing new about this wooden sandwich; in fact there is a plywood mummy case in the Metropolitan Museum of Art. This early example of plywood manufacture was made in 1900 B.C.

The real reason why plywood has not been used to a greater extent is that until the last few years we lacked a strong, cheap, and waterproof bonding agent or glue. The new bonding agents are not only used to bond together the individual wooden sheets making up a sheet of plywood, but are used to unite built up or moulded arches and trusses such as shown in the pictures on the opposite page.

The White Salmon gymnasium and auditorium shown in finished form on the cover and while under construction on the opposite page is a complete plywood structure. No nails were used in constructing the building. Except for the floor the entire building is glued together. The outside of the gym is painted with a synthetic resin bound plastic paint. This is true of the roof as well as the side walls. This type is known as prefabricated building and can be erected in less than one third the time necessary for conventional construction.

Low construction cost

The cost of the White Salmon gym, which seats 700 for basketball and 2,000 when used as an auditorium, was approximately $15,000. It is estimated that this is $1,500 less than for conventional construction. There should be further saving over a period of years as this type of construction lowers the heating costs.

The Darlington gym shown in the lower picture on the opposite page uses arch frames of plywood forcibly curved and glue-welded into solid timbers. These plywood arches are used instead of the conventional steel truss construction. They allow for lower sidewalls without any sacrifice of playing clearance. The wooden arches, aside from being practical, add a richness to the interior which is particularly desirable when the building is to be used as an auditorium as well as a gym.

The gym at Darlington is 63 ft. wide and 86 ft. 6 in. long. The playing court is 47 by 84 ft. 6 in. but the actual marked out court is 44 by 75 ft.

New Books on the Sportshelf

CREATIVE TAP DANCING. By Mary Jane Hungerford. Pp. 213. Illustrated — free-line drawings. New York: Prentice-Hall, Inc. $2.50.

THIS is not one of those hastily thrown-together brochures which shows you how to become the life of the party in ten easy lessons. ("They laughed when I got up to dance, but their laughter changed to thunderous applause when I cleverly shuffled off to Buffalo.") Mary Jane Hungerford, dance instructor at the University of Southern California, wrote this book in response to many requests by teachers of physical education.

Her approach to the subject is purely scientific. First, she analyzes the fundamentals of tap dancing; second, she shows how these fundamentals are organized to build simple forms; and, third, she shows how it is possible to stimulate and direct the creative effort of the student until he is able to take charge of his own progress.

The author covers her subject in three main sections: backgrounds and analysis, dances and teaching problems. In the first section, she outlines the history of tap dancing and analyzes the subject matter from the standpoint of movement, time and form. In the section on dances, she gives six character dances, six elementary rhythm dances and six advanced rhythm dances. Each step in the instruction is completely illustrated with line drawings which clearly show the successive leg and foot positions. Most of the actual music is given, and an ingenious system of notation shows how it is possible to record your own dance steps and to read them just as easily as a musician reads music.

The third section, on teaching problems, covers the values of tap dancing, equipment, materials and methods, and leadership.

THE BARNES DOLLAR SPORTS LIBRARY: Wrestling, Skating, Skiing. Pp. 92-115. Illustrated — photographs and drawings. New York: A. S. Barnes & Co. $1 each.

TIME and *The Barnes Dollar Sports Library* keep marching on. The seven volumes already on the shelves of the fastest growing little library in the sports field have been augmented recently by three new arrivals: *Wrestling* by E. C. Gallagher, *Skating* by Harold Putnam and Dwight Parkinson, and *Skiing* by Walter Prager.

Like their predecessors, the newest additions offer the reader a wealth of information at bargain prices. The subject matter is covered comprehensively, organized excellently and illustrated with many photographs and free-line drawings based on continuous action pictures.

In the wrestling opus, however, the text only subserves the illustrations. The author, who is without question the outstanding college wrestling coach in the country, having produced 50 national champions and won ten of the last twelve intercollegiate championships for Oklahoma A. & M., spent a year collecting the gallery of 148 single action photographs which make up the bulk of the book. The text consists of terse captions underneath each picture.

The grips are illustrated under five major headings: standing, to bring to mat, holds, escapes, and falls. A brief chapter on miscellaneous training hints rounds out the volume.

Skating and *Skiing* have both evolved from *The Dartmouth Book of Winter Sports.* The volumes are important sections of the omnibus and have been published separately to give the coaches who are interested only in skating or skiing a chance to get the information without having to pay for the other material as well.

Skating contains excellent, easy-to-follow information on equipment and plain, speed and figure skating. *Skiing* is a practical handbook dealing with downhill, cross-country, jumping, and slalom skiing, and ski equipment.

All the text and illustrations have been lifted bodily out of the omnibus.

The dollar books are attractively presented with hard covers and colorful jackets.

DECEPTION IN SIXMAN FOOTBALL. By Herbert E. Phillips. Pp. 71. Illustrated — photographs and diagrams. Monticello (Fla.): Athletic Publications Co. $1.

MR. PHILLIPS makes no bones about the purpose of his book. At the very outset he pledges that, unlike other sixman books he has read, *Deception in Sixman Football* will not tell you "how much the game costs (you already know); the number of injuries you have had (you don't care); how to pick an all-star team (you'll do it any darn way you please); or how to conduct a football tournament (p-u)." In short, he intends to stick close to his subject, which is sixman football.

The author believes that deception is the keynote to the sixman attack, and for that reason employs an adaptation of the double wingback system in his coaching (Monticello, Fla., High School). He outlines this system, which features a man in motion, in its entirety and supplements the exposition with a set of plays. He then describes his defensive scheme against both passes and running plays.

Followers of *Scholastic Coach* will probably recognize the philosophy underlying this pocket-sized volume (it is 5- by 6½-in. in size). Mr. Phillips passed along much of the material in an excellent article last September, entitled "Adapting the Double Wing to Six-Man."

Straightaway Skating

This article on straightaway skating is reprinted, with special permission, from the excellent text, "The Dartmouth Book of Winter Sports," edited by Harold Putnam, published and copyright 1939 by A. S. Barnes & Co.

EUROPEAN or American style! Long has the battle waged! There are two distinct schools of skaters in this world of ice sports: devotees of European style and American style skating. The tracks are different; the contests are different; and most important of all, their style of skating is different!

European speed-skating races are conducted with two skaters skating against time in separate lanes. This system of skating resolves European races into a question of endurance and skating skill.

American speed-skaters are addicted to man-to-man competition, where the laurels go to the man who crosses the line first, without too much regard to how he got there. Although endurance and skill are necessary in American competition, something of a premium is put on finesse—skating tactics!

In American skating it is smart to stay off the pace, and "tail" the pack in the early stages of the race, letting less-skilled skaters break the wind. It is smart to move up slowly in the closing stages of a race, "breaking" sharply only when you know you can hold a sprint all the way to the finish. These perfectly logical tactics are too often augmented, however, with "team-work" —a team plan of attack which is designed to bottle up some particularly brilliant individual star. "Boxing" (keeping a skater from breaking out of line) can be artful enough to escape any detection. "Towing" can be indulged in on a team basis, a not-so-good skater setting a hot pace for a few laps, being succeeded by another member of the team—the design being to burn out some star who's crazy enough to follow the wilting pace.

European tracks, laid out in two parallel lanes, are designed to prevent any interference with the skater and any assistance to him. He skates on his own! The result has been a not-so-spectacular contest, but beautiful skating. There is no part of athletics any prettier to watch than a great exponent of the European style of speed-skating. It's a rolling, weaving gracefulness, rarely found even in the best American skaters.

The European style is characterized by an extremely low crouch, minimum use of the arms, and long glide. Looking down on the back of a crouched skater, while he moves along in European style, you would see his hips follow a straight line, his feet deviate from the straight line only slightly on each side, and his shoulders weave decidedly, swinging approximately one foot to each side.

This technique is designed to use a skater's weight to maximum advantage, diminishing strain on leg muscles, which becomes severe in some of the longer races. This is accomplished by turning slightly on the heel at the end of a stroke, accentuating the shoulder weaving, and "snaking your way." The weight of the body is carried as far back as possible, and the free leg returns more slowly from the stroke. The glide is held as long as possible by virtue of powerful thrusts from the deep-riding position. Excellent balance is necessary.

In either style, the shoulder over the forward knee should be lowered slightly, the head being turned slightly to the side opposite the knee. (E.g., As the right knee is forward, the right shoulder is lower, and the head is turned slightly to the left.) Most skaters have found it smart to exaggerate both the weave of the shoulders and the depth of their crouch in practice, finding that it both improves their form and adds to their reserve power in competition.

The skate track of the European stroke curves out, then in again. The track of the American style curves out in an even arch. "Pug" Goldthwait has achieved marked success with a style which in many respects combines these two. His skate track is almost straight, pointing out only slightly. It has been a fall-over stroke, in which the skater holds one stroke longer than usual in American style, then "falls over" onto the other skate.

If more power or speed is desired than would be obtained simply by utilizing one's weight, the skater should push with the same motion of the American style skater, but still keep the skate track straight. In this stroke the body does not weave sideways on the straightaway, but is always straight, the shoulders dipping slightly up and down, but not from side to side. When not on one's back, the arms should swing slightly bent, one across the knees, the other back a foot off and above the hips. This style has served both to utilize weight better than the average American style and to make possible a sudden sprint, so vital in American racing, although not used much in Europe.

(Concluded on page 48)

KANSAS BASKETBALL EVALUATION STUDY

A systematic method of rating the all-round ability of the individual player and the team

By V. W. Lapp, F. C. Allen and E. R. Elbel

During the past two basketball seasons at the University of Kansas, Drs. V. W. Lapp, Forrest C. Allen and E. R. Elbel collaborated on an exhaustive study of the Jayhawks' offense and defense with the idea of working out a reliable system to measure individual and team ability. Scholastic Coach presents their findings in two installments, the first of which is devoted to their research work on team play. Dr. Allen is basketball coach and director of physical education and his confreres are assistant professors of physical education.

AS LONG as we have box scores the scoring column will probably remain the universal yardstick for measuring basketball ability. As yet, no method has been devised to measure a player's ability in the other important phases of the game. For this reason, the high scorer of the team is generally accepted as its most prolific player. In most cases, he is entitled to the distinction. But there have been high scorers who were not even entitled to their varsity rating.

To get a true picture of a player's worth, it is necessary to weigh all the elements that enter into the composition of good basketball. With this idea in mind, the writers, during the 1937-38 season, set out to devise a systematic method of rating players. The basketball court at Kansas was used as a laboratory and the varsity five as the subjects.

The first step was the compilation of a list of offensive elements. Each of these elements was weighed subjectively. The importance of the item determined its weight in evaluation points. This scale ranged from one to ten points, with a field goal representing the desideratum supreme. The items and their weight in evaluation points are contained in Table 1.

The nomenclature is familiar for the most part but several of the terms may require definition. The unordinary terms and their definitions follow:

IMMEDIATE ASSIST: a pass made to a player who scores a field goal. A secondary assist is the pass directly preceding an immediate assist.

ERROR OF OMISSION: a mistake in judgment or observation, such as a failure to pass to a teammate who is in better position to score.

TEAM EFFICIENCY: the team's positive evaluation points divided by its positive plus negative evaluation points. The player's efficiency is determined in the same manner, using his individual evaluation points as a basis.

SCORING ABILITY INDEX: the number of goals multiplied by the percent of goals made plus one half of the total gained by multiplying the free throws by percent of successful free-throw tries.

BALL-HANDLING ERROR RATE: the ball-handling errors divided by the sum of the good catches, good passes and ball-handling errors.

Using these standards as a basis, data were collected on the Kansas team during its 17 home games over the past two years. The averages over this period are shown in Table 2. Since the statistics for each of the two seasons were fairly consistent, the 17-game averages may be considered reliable. The 1939 team took more shots than the 1938 five, but averaged one less goal per game. The number of free throws awarded during each season was practically identical, but the number converted was slightly less in 1938-39.

During the past season, the total number of positive evaluation points was a little lower than the preceding year's total. This may have been due to two reasons. First, there was a change in the technique of tabulating immediate assists. In the first year of the study, credit was given for both passes and catches. This gave the players double credit in evaluation points. In the 1938-39 study, however, a player received credit only once. The second factor that may have had a bearing on the lower total was that the recovery of rebounds off the opponents' backboard last year was computed with the defensive play instead of offensive play as in 1937-38.

The drop in negative offensive evaluation points last season indicates that the team made fewer mistakes than in 1938. It is possible that a special bulletin board service may have had something to do with it. Last season, team summaries were posted in the dressing room on the day following each game. This may have made the players more

TEAM SUMMARY (TABLE 3)

Team	Score	Goals Made	% Goals Made	Free Throws Made	% Free Throws Made	Personal Fouls	Total Passes and Catches	Ball-handling Errors	% Ball-handling Errors	Rebound Recovery	Violations	Efficiencies: Offensive %	Efficiencies: Defensive %	Efficiencies: Composite %	Eval. Pts.
Kansas	27	8	14.5	9	52.9	15	732	8	1.1	32	2	95.4	52.0	86.9	890
A	20	6	13.3	8	47.1	14	670	20	2.1	27	8	90.8	52.3	82.9	754
Kansas	39	16	23.8	7	50	14	793	6	0.8	47	5	96.4	55.4	89.2	1121
B	33	11	18.9	11	78.6	13	561	6	1.1	28	2	96.8	46.9	87.2	757
Kansas	33	10	16.7	13	72.2	14	583	8	1.4	43	7	93.4	61.7	86.1	846
C	29	10	18.5	9	52.9	16	518	16	3.0	33	1	94.4	45.3	83.3	689
Kansas	37	15	16.9	7	53.8	14	754	14	1.8	36	2	95.9	54.1	88.4	1048
D	32	13	20	6	42.9	12	596	10	1.6	39	0	95.0	61.7	88.1	835
Kansas	34	15	22.7	4	36.4	9	734	13	1.8	37	0	97.8	64.2	92.5	1061
E	27	10	20.4	7	63.6	11	608	8	1.3	38	5	95.4	59.1	88.2	828
Kansas	49	22	29.3	5	27.8	11	734	16	2.1	57	9	93.5	67.6	88.7	1141
F	46	19	28.4	8	53.3	15	421	7	1.6	37	2	94.8	49.5	85.	721
Kansas	46	16	21.3	14	63.6	14	788	4	0.5	48	4	94.6	65.8	89.9	1153
G	37	15	24.6	7	43.8	17	598	14	2.3	19	1	96.1	33.7	84.6	767
Kansas	59	23	24.7	13	81.2	13	711	8	1.1	39	1	97.6	56.6	91.2	1169
H	45	18	24	9	69.2	14	400	18	4.3	24	9	88.2	34.1	79.1	581
Kansas Totals	322	125	21.5	72	55.8	104	5829	77	1.3	339	30	95.6	59.8	89.2	8053
Opp. Totals	269	102	21.7	65	55.6	112	4372	99	2.2	245	28	93.9	48.5	84.8	5932

Table 1

Items Used in Evaluation Study

	Wt. in eval. pts.
OFFENSIVE	
A. Positive items	
1. Field goals	10
2. Free throws	5
3. Immediate assists	4
4. Secondary assists	3
5. Recovers ball off own backboard	2
6. Recovers teammate's jump ball	1
7. Recovers opponent's fumble..	1
8. Good pass to a teammate.....	1
9. Catches teammate's pass.....	1
B. Negative items	
1. Error of omission.....	1
2. Held ball forced by opponent..	1
3. Fumbles ball, goes out of bounds	2
4. Fumbles ball, obtained by opponent	2
5. Taps ball out of bounds.....	2
6. Wild pass out of bounds.....	3
7. Wild pass to an opponent.....	4
8. Violation of rules.....	5
9. Offensive personal foul.....	8
DEFENSIVE	
A. Positive items	
1. Blocking opponent's shot.....	4
2. Recovery off def. backboard..	4
3. Intercepting dribble	3
4. Intercepting pass	2
5. Forcing held ball.....	2
6. Batting ball from opponent's hands and recovering.....	2
7. Batting ball from opponent's hands and not recovering....	1
8. Cuts off opponent's pass, but not recovering	1
B. Negative items	
1. Fouling opponent with ball...	8
2. Fouling opponent without ball	8

conscious of their mistakes, with the end result that fewer were made.

The positive defensive evaluation points (as shown in Table 1) do not accumulate as rapidly as the offensive points. However, this is not true of the negative defensive points. During the 1938-39 season, the negative defensive points accumuated almost twice as fast as the negative offensive points. The penalty for fouling is naturally high, as a player who commits a foul gives his opponent a chance to make 5 or 10 positive offensive points. In games a player was forced out by fouls his total negative points exceeded his positive points.

The team summaries (Table 3) were compiled during the past home season. Kansas did not lose a game on its court that season and lost only one in 1937-38. Due to their peculiar style of play, the Jayhawks do more passing than most teams, a point the table brings out clearly. Even in defeat, Kansas would probably show a higher evaluation point total than the opponents.

Included in the team summary is a new term — defensive efficiency, which is obtained by dividing the total positive defensive evaluation points by the sum of the positive and negative defensive points. Due

Table 2

Averages of the Kansas Team 1938-39 Study

	1938 9-Game Ave.	1939 8-Game Ave.	17-Game Ave.
Score	42.7	40.3	41.5
Goals attempted	61.5	72.8	66.8
Goals made	16.5	15.6	16.1
Free throws attempted	16	16.1	16.1
Free throws made	9.56	9	9.3
Personal fouls	10.2	12.1	11.1
Offensive personal fouls	.78	.88	.82
Violations	3.7	3.8	3.7
Rebounds from own bank	21.3	15	18.3
Rebounds from def. bank	22.3	27.4	24.7
Total passes and catches	706.3	728.6	716.8
Wild Passes	7.57	3.5	5.6
Held balls obtained by opp.	3.1	3.3	3.2
Fumbles	6.1	2.9	5.2
Recovers jump ball	10.8	7.1	9.1
Offen. pos. eval. pts.	1103	1055	1080.4
Offen. neg. eval. pts.	73.2	48.4	61.5
Defen. pos. eval. pts.	—	144	—
Defen. neg. eval. pts.	—	97	—
Net eval. pts. per player per minute of play	5.14	5.3	5.2
Immediate assists	13	13.4	13.2
Secondary assists	11	11.3	11.1

to the ease with which negative defensive points may be accumulated, the efficiencies for defense are low. The composite efficiency is based on the net positive and negative points that are earned during the entire game. From the table it appears as though this item is more closely related to the game score than some of the other items.

A close examination of the game with team D (Table 3) will lead the observer to wonder just how Kansas managed to win. Outside of the goals made, the statistics are largely in favor of the opponents.

In comparing the totals it is interesting to note that the outstanding differences occurred in two places: in the recovery of rebounds and in ball-handling. In the recovery of rebounds, Kansas made 339 to the opponents' 245. The ball-handling column shows that Kansas caught and passed 5829 times and the opponents, 4372.

This difference, as explained before, is probably due to the fact that the Jayhawks do more passing than most teams. However, when you consider the column devoted to ball-handling errors (wild passes, fumbles and held balls obtained by opponents), it is noted that the home team made only 77 errors to the opponents' 99. The fact that the Jayhawks handled the ball 1457 more times than their opponents and made 22 fewer mistakes is very significant.

Electric Timers

(Continued from page 37)

hand requires eight minutes to complete a rotation which corresponds to one quarter. The second hand travels around the circle once every minute. In many clocks of this type the face turns red during the last minute of the quarter. The dial is constructed of ground glass and is illuminated from behind.

Another type of electric wall clock has the dial divided into four or two sections corresponding to each quarter or half of the game. These segments are shaded or painted a different color than the numbers which denote the actual playing time. The minute marks indicating the beginning and end of the game are placed just enough below each side of the horizontal diameter of the dial to form a symmetrical pattern, leaving a circular sector on the lower portion of the clock face available for over-times or school advertising purposes.

Both of these types of clocks are operated from the timer's bench by remote control. No provision has been found necessary for reversing the motion of the hands. Most of the clocks on the market have an electric horn which sounds automatically as the period or game ends.

Also among the last, but by no means least, of the points in favor of a wall clock is that neither players nor spectators have to bother the timekeeper with questions about the time remaining to be played. Since the time indicated on the wall clock is official, and time-outs are kept at the timer's bench on the ordinary stop watch, the spectators, players, coaches, and officials act as a sort of double check on the timekeeper.

As an added service, many electric boards will supply a time-out clock in conjunction with the control panel. The time-out clock is electrically interconnected with the main spectator clock so that at the instant the main clock is stopped, the time-out clock starts. When the main clock starts, the time-out clock automatically resets itself. The time-out clock may also be set for any pre-determined time-out period.

The wall clock has definite spectator appeal. Frequently, near the end of a period, the fans may yell in concerted fashion at players to shoot. While this practice may be undesirable from a coaching angle, it increases spectator interest and helps make basketball a more popular game.

Gymnasium Mats

WHETHER it is used for wrestling, boxing, tumbling, general exercising or as a buffer around the basketball court, the gym mat must give constant protection to the bodies that come into contact with it. It must always be full, thick, soft and resilient; it must never have any sharp projections on the surface or working through from the inside that can cause painful cuts and scratches.

Since gym mat felting can now be made without the use of needles, the danger of broken needles can be eliminated. The most dangerous of all gym mat fillers is "punched" felt, made with agitating boards with thousands of barbed needles. This type of felt often contains broken needles.

Some of the factors which determine the usefulness of the mat are: First, there is the weight and quality of the cotton duck or canvas, as the layman calls it, that is used as the outer covering. If it is too light in weight, it will tear easily and will have to be mended constantly; if it is too heavy it will be expensive, hard to roll and difficult to handle. The best practice is to use either No. 8 duck which weighs 18 ounces to the square yard, or No. 6 duck which weighs 21 ounces — the choice depending on the size of the mat and its use. "Numbered" cotton duck, as made to meet U. S. Government specifications, should always be used.

Tufting is another important factor in mat construction. Cheap mats are often tufted with unwaxed seine twine which is hard and coarse and, many times, cuts the canvas and pulls the tufts through. The best tufting is done with several plies of good twine, twisted and waxed for added strength.

The handles should be sewed to a reinforcing patch set in the sides of the mat and then sewed, or sewed and riveted to the wall of the mat.

The filler is the most important part of the mat. The best filler is made entirely from hair, reinforced with a center strip of burlap fabric.

Speed Skating

(Continued from page 43)

These problems of style, of course, chiefly concern the expert. The beginner needs only to learn to skate smoothly, which entails keeping the body low, the back arched only slightly and supported by the arms, keeping the blades of the skates parallel to the ice on the return. Most beginners have a marked tendency to push with their toes, especially when using long speed-skates. This should be discouraged, for it only reduces speed and invites spills. A pretty fair way to test a skater's ability is to close your eyes as he goes by. If he sounds like a man cutting ice with a saw, he isn't much good. If you barely hear a whisper that sounds like a razor blade being drawn across an ice cube, it will be Olympian George Wallace!

Racing turns

Sprinting a corner is an American innovation. And it's a spectacular and highly-effective indulgence when done by some of the better North American guests.

In European style racing against time, the skater merely sets the pace he knows he can hold for the duration of the event, and grinds it out. No acceleration on corners is necessary or advisable for him, for it would merely mean he had been holding himself in before or wouldn't have anything left for the after.

For the American skater, however, accustomed to holding his best in reserve until the concluding stages of a race, an ability to sprint corners is important.

It consists merely of turning the body somewhat sideways to the right and running with the blades of the skates almost at right angles to the edge of the track. The faster one speeds the more acute the angle will be. What it amounts to is rapid sideways running, done from a low crouched position for plenty of leg power, throwing the right (outside) leg over in front and shooting the left (inside) leg through beneath the other leg.

The high-speed technique for corners is chiefly employed in short sprint races and in the concluding stages of longer American style races.

Ordinarily, corners are skated with only slight modifications of the smooth straightaway stride. The right foot is crossed over the left; the left is thrust backward beneath the right foot, a real push being given off the outside edge of the left skate, especially from the left heel. Although this is simple enough when you know how, it is one of the chief difficulties of beginners and one of the reasons so many fall behind on turns while skating stride for stride with a good skater. It's simple to thrust with the right foot as usual, then coast the left skate through without pushing on it. If a thrust is made with both feet, no speed should be lost.

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